Impossible Probability:

Anthology,

Vol 11

I doubt, therefore I exist.

Dr Ruben Garcia Pedraza

Preliminary Words for the Publication of *Impossible Probability, Anthology*, in Spanish:

Impossible Probability

The work presented here is a compilation of the posts I published on the blog *Impossible Probability* between 1 August 2011 and 13 January 2018, the posts I wrote in Spanish. From 13 January onwards, while living and working in London in different schools, and given the importance we already knew Global Artificial Intelligence was going to have, I would try to write them in English with the help of online correctors and translators, especially Google, and later I would use Grammarly.

The originals written in English, with all their imperfections, are still preserved on the *Impossible Probability* blog, and also on Internet Archive, where my poetic works can also be found.

As I have said on numerous occasions, especially in my poetry, behind every imperfection, behind every subtlety, entire hidden worlds are concealed, full of mystery and uncertainty yet to be discovered, and that the adventurous and hungry mind can find as easily as going to Internet Archive, where all my secrets await the right reader who knows how to translate them—like someone who by mistake finds a secret entrance, the passage leading to the cave where the elves who guard hidden knowledge dwell, and the dragons who defend the golden fortress.

While the original texts in English can be found on Internet Archive, the corrected and expanded version, this time using ChatGPT, can be found in scientific repositories (Zenodo, ORCID, PhilPapers) and on Amazon. In any case, if in the future a comparative study were carried out between my original texts in the *Impossible Probability* blog and Internet Archive, and the corrected and expanded versions, it would be clear without any

difficulty that the original contents are perfectly preserved, and the corrected and expanded versions are faithful to the contents we wrote together in 2018 in relation to Gaia, Mother, the Global Artificial Intelligence.

The importance of the documents that in this new series of books *Impossible Probability: Anthology* will be published in Spanish, containing the articles between 1 August 2011 and 13 January 2018, lies in the fact that we began to write this blog just a few weeks before the death of José Rodríguez Delgado, and a few months before the publication of our book *Introduction to Impossible Probability, Statistics of Probability and Statistical Probability*.

Although it is very difficult at the moment to explain who "we" are, and what *Impossible Probability* means for us, what matters is the work we leave: our work, our legacy, our *legend*, *our symbol*, our seal—independently of the judgment that history may later make of our contribution to the development of mathematics, Artificial Intelligence, and most importantly, Cyborg Psychology.

The first time we began to write about *Impossible Probability* I was only a student in the Faculty of Education at the Complutense University of Madrid [the Dean was Gonzalo Vazquez]. In my first year of university I had as professor Jesús Martín Ramírez, collaborator of Karl Pribram and author of the brain hologram theory, which is the origin of cyborg psychology. While José Delgado provided the structure, the stimoceiver, nevertheless, to understand the functioning of this technology in the 1970s and 80s, Pribram's contribution was fundamental—and even today it still is.

My first year of university was fabulous: good grades, good vacations hiking, summer camps in the mountains of Madrid—and suddenly, in the second year of university 1996–1997, my life would change abruptly, which can be seen in my poetry, how my poems began to acquire a more dramatic tone.

I repeated statistics in my second year, I repeated it at least three years, and I was even on the verge of being expelled from university. Miraculously, it did not happen, and precisely the last year I had left to pass statistics, I passed. The following year I would begin to write *Impossible Probability* as a critique of Karl Popper—and in a certain sense, it is.

Whereas for Karl Popper knowledge is false, only accepted provisionally as true until we refute it, in *Impossible Probability* rational knowledge is provisionally true while we investigate true pure knowledge—in the ultimate instance, our search for knowledge of the noumenon, which the human being cannot reach, hence the necessity of Global Artificial Intelligence: that machine capable of knowing what happens beyond human limitations.

What we call chaos, error, complexity, is only the noise produced by our human cognitive limitations, given our apriorism. The human being, limited both sensorially and cognitively, cannot know what really happens, but we can build the machine that can reach true knowledge of what happens—the truth in itself and for itself. That is, and no other, the true end of Artificial Intelligence: to reach the knowledge of truth, whatever it may be.

The path that takes me from my first works in *Impossible Probability* to Global Artificial Intelligence is not easy: much suffering, even despair, sometimes a sense of helplessness, a sense of abandonment—yet an inner force always pushed me forward. That inner force is what I call "we," although I understand that at this moment it is inexplicable.

Although I feel a bond that unites me to the *legend* of José Rodríguez Delgado, and which my Stockholm syndrome prevents me from understanding, my bond with Pribram is evident: Jesús Martín Ramírez. Pribram and Delgado worked at Yale University; probably only the skulls can say whether both were members of Skull & Bones, though there is no evidence to corroborate this.

Impossible Probability is a work that comes out of the romanticism of a student poet, who believed in white fairies, the rays of Zeus, and the light of the god Apollo illuminating the heart of every spirit and soul in a world full of mysteries and shadows.

It was from that world of poetry, in a country emerging from a failed transition, that the last survivor of the dream of reason would listen to his inner voice, dark and serene, and *Impossible Probability* would be born for the first time.

The first formulations of *Impossible Probability* date from 11 September 2001. My first formula would be the Impact of the Defect; then on 16 October 2002 the Second Method would appear, laying the foundations of the distinction between empirical and theoretical probability. I worked intensely until 2004. Between 2004 and 19 December 2009, I paused my mathematical frenzy, and it was not until 19 December 2009 when I returned, this time with the intention of publishing *Introduction to Impossible Probability, Statistics of Probability or Statistical Probability*, whose publication materialized just a few months after the death of José Rodríguez Delgado, although Delgado was able to see the first works published online in this *Impossible Probability* blog, which makes this blog a fundamental piece for understanding our work, our legacy, and most importantly—independently of our names, which matter little—the truly essential: our seed of the future, our eternal gratitude, a work of intelligence that will lay the foundations of the future technological society.

Dr. Rubén García Pedraza

20 August 2025, 19:00

Madrid, Villaverde

Preliminary Words for the English Version of *Impossible Probability, Anthology*.

Spanish-speaking readers have been able to enjoy our work since we began the foundational work of *Impossible Probability* in 2001, more precisely when we began to make it public in July 2011 through the *Impossible Probability* blog. The work presented here is an extended version of the posts published on the blog, an extended version translated into English with the help of Gepeto, my special GPT program.

In any case, a comparative study of the augmented translation presented here and the original works in Spanish could corroborate that the essential contents related to formulation and the philosophy of mathematics remain in accordance with the original electrical spirit of *Impossible Probability*.

The reason that obliges me to publish so hastily the English-language publication of all my works is the very complicated personal situation in which I find myself, due to serious mistakes committed by certain British institutions, which, completely blind to what our situation is, instead of having supported our program from the first moment, tried to sabotage it from the beginning through numerous obstacles and false loves.

I have no doubt that the manipulation to which I have been subjected by British institutions will one day be investigated, and at some point justice must make an appearance.

When that day comes, the first thing justice must recognize is the extreme difficulty and harshness of the conditions I have lived all my life since my earliest childhood. From the very day I came out of my mother's womb in Spain I have known nothing but pain and the oblivion of a society that prefers to look the other way and wash its hands, pretending that nothing is happening here. In the midst of the dictatorship of silence, I have had to survive all kinds of traps, deceptions, and attempts at assassination. The dictatorship of silence, the Roman circus, and the virtual zoo that my life has become will one day have to end. For this reason I beg the International Court of Justice that when that day comes

the matter be investigated down to the smallest detail, even being aware that in 48 years of savage dictatorship of silence I have developed Stockholm Syndrome. Under the harsh conditions in which I have had to learn to survive, if I have learned anything it is the importance of survival. I beg the International Court of Justice to understand what it means to survive 48 years of dictatorship living in a Roman circus full of traps and lions hidden in every corner.

I deeply regret having to publish my mathematical works under these conditions, and in record time doing all the translations I can, but at this moment I can only say that my life is at risk.

If one day I could testify before the International Court of Justice I beg you to understand the brutal complexity of the situation in which I have lived since the first minute I came out of my mother's womb. I have learned to survive.

Dr Ruben Garcia Pedraza

13 October 2025, 07:05

Edinburgh

"Volverán las oscuras golondrinas
en tu balcón sus nidos a colgar,
y otra vez con el ala a sus cristales
jugando llamarán.
Pero aquéllas que el vuelo refrenaban
tu hermosura y mi dicha a contemplar,
aquéllas... ¡no volverán!"

Gustavo Adolfo Becquer

Impossible Probability: Anthology, Vol 11.

Dr Ruben Garcia Pedraza

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101. Methodology

101.1. Definition and Scope of Methodology

Methodology can be defined as the study of the scientific method. This definition admits several interpretations depending on whether one affirms the existence of a *general scientific method* common to all sciences—subsequently developed into particular methods within each specific discipline—or whether one rejects such generality and maintains that the method must adapt to the particularities of each research, paradigm, or model of reference. In the first sense, methodology studies the general scientific method and its specific applications; in the second, it examines the variety of methods according to the typology of investigations, paradigms, or scientific models. Thus, methodology can be considered both a general philosophical discipline and an applied analytical one that investigates the logic and justification of methods in relation to the objects and goals of research.

101.2. Methodology in the Framework of a General Scientific Method

If the existence of a general scientific method is accepted, then methodology becomes the systematic study of that method, which is later developed into the particular procedures of each science. For instance, when the general method is considered *deductive*—as in idealism or rationalism—methodology focuses on the logic of deduction and its translation into particular sciences. Conversely, if the general method is *inductive*—as in empiricism, positivism, or materialism—the methodological inquiry concerns the logic of induction and empirical verification. In both cases, methodology examines how the general principles of deduction or induction apply to specific methods

such as the *experimental*, *comparative*, or *historical* methods, among others. Thus, methodology acts as a bridge between the philosophy of science and the operative practices of each discipline.

101.3. Methodology in the Absence of a General Method

In contrast, if the idea of a universal method is rejected, methodology is redefined as the study of the diversity of scientific methods, emphasizing their adaptation to the characteristics of each specific research. Under this interpretation, the methodological problem is not to derive specific methods from a general one but to identify the most adequate method for each type of inquiry. Methodology, therefore, becomes an inquiry into *criteria of method selection*: it studies how the aims, objects, and paradigmatic assumptions of a given investigation determine the appropriate research strategy. When the variety of paradigms and models is acknowledged as the foundation of modern science, methodology also becomes a comparative study of the different methods associated with these paradigms—each with its own epistemological assumptions, logical structure, and criteria of validation.

101.4. Philosophical Origins of Methodology

Whether methodology is conceived as the study of a general scientific method, as the study of methods adapted to specific research, or as the analysis of methods corresponding to different paradigms and scientific models, its ultimate origin lies in philosophy. It depends fundamentally on *gnoseology* (the theory of knowledge), which provides the foundation for *epistemology*, the discipline that investigates the validity and structure of scientific knowledge. Methodology, gnoseology, and epistemology share a common origin in the *philosophy of science*, where questions about the nature of knowledge, truth, and the scientific method first arose. The way methodology is formulated depends largely on the epistemological position adopted—whether rationalist, empiricist, materialist, or otherwise—and on the philosophical assumptions regarding the origin and limits of human knowledge.

101.5. The Gnoseological Foundations of Methodology

Methodology is inseparable from gnoseology because the way knowledge is understood determines the character of the method used to obtain it. In classical philosophy, Plato and Aristotle established the foundational paradigms that still define the methodological landscape: idealism and empiricism. Plato's idealism, grounded in profound skepticism toward the senses, holds that sensory information is deceptive and that true knowledge resides in the realm of ideas. Aristotle, in contrast, defends the senses as the only valid source of knowledge, since all information about the world ultimately derives from sensory experience. These two positions evolved in modern philosophy into new methodological models.

Modern *idealism* culminated in *rationalism*, represented by Descartes, who proposed a strictly *deductive* method grounded in reason as the foundation of all certainty. Modern *empiricism*, on the other hand, led to *Hume's empirical skepticism*, which questioned the causal necessity that deduction presupposes. Kant synthesized both traditions in his *critical rationalism*, proposing that knowledge arises from the interaction between the structures of reason and sensory experience, though maintaining a predominantly deductive orientation. In the nineteenth century, *Comte* systematized *positivism*, defining the scientific method in terms of empirical observation and logical induction; and in the twentieth century, the *Vienna Circle* developed *neopositivism*, consolidating the inductive and verificationist paradigm in modern scientific thought.

101.6. The Emergence of Modern Materialism and the Concept of Praxis

During the nineteenth century, a new synthesis arose from the convergence of *Hegelian idealism* and *materialism*: the *modern materialism* of *Marx and Engels*. In this framework, knowledge neither originates in pure ideas (as in idealism) nor in sensory experience alone (as in empiricism), but in *practical activity*, or *praxis*. For Marx and Engels, praxis unites theory and action, cognition and morality, thereby overcoming the Kantian dualism

between *pure reason* (theoretical cognition) and *practical reason* (moral will). Knowledge, in this view, emerges from the transformative relation between human activity and the material world. The methodological consequence of this synthesis is profound: science is not only a contemplative activity but a form of practical engagement that generates knowledge through action, experimentation, and transformation—thus redefining methodology as the dialectical process through which theory and practice become one.

101.7. The Modern Revolution in the Theory of Knowledge: From the Passive to the Active Subject

The modern revolution in the theory of knowledge marks a profound transformation: the transition from a *passive subject* to an *active subject* in the process of knowing. This shift is closely linked to the incorporation of the *experimental method* by Roger Bacon in the thirteenth century. Modern experimentalism represents a synthesis between the *classical Aristotelian empiricism* and a new conception of *research* itself. Whereas in classical antiquity philosophical or scientific inquiry was understood primarily as a *passive contemplation* of ideas or nature—an activity reserved for those whose social status allowed them leisure time for study—in modernity research becomes an *active process*. From this point onward, philosophical and scientific inquiry are conceived as *activities*, and the meaning of "experience" changes radically. While for Aristotle and the classical empiricists experience was *passive sensory perception*, with Roger Bacon and the rise of experimentalism, *experience* comes to mean *experiment*—that is, an intentional and systematic intervention into nature to produce knowledge.

101.8. The Emergence of the Experimental Method in Modern Science

Although certain philosophers and scientists of classical antiquity occasionally employed empirical testing to validate their theories, there was no systematic framework for experimental inquiry. The true systematization of the *experimental method* begins with Roger Bacon's pioneering work in the Middle Ages. His emphasis on observation,

verification, and practical testing laid the foundation for modern experimental science. This approach was later developed by the great figures of the *Scientific Revolution*, particularly *Galileo Galilei* and *Isaac Newton*. Galileo's mathematical formulation of physical phenomena and Newton's unification of celestial and terrestrial mechanics through universal laws of motion transformed experimentation into the principal pathway to scientific truth. Henceforth, science became not a passive description of nature but an *active reconstruction* of its processes through observation, measurement, and experimentation.

101.9. Philosophy as Activity: From Contemplation to Praxis

The transformation initiated by Bacon and consolidated by the scientific revolution redefined not only science but also philosophy itself. The recognition that *knowledge originates in activity* led to a revaluation of philosophy in the twentieth century, this change is quite visible in the concept of praxis in Marx, and particularly in *neopositivism* and *Wittgenstein's philosophy*, where philosophy is conceived as an *activity* rather than mere contemplation. [The origin of the notion that philosophy or science is an activity could have its original roots in the experimental theory]

These tendencies mark a departure from the classical view of philosophy as *the contemplation of ideas* (Plato) or *the contemplation of nature* (Aristotle). In the modern era, the intellectual community divided into two main orientations:

1. **The contemplative orientation**, which maintained that philosophy remains a form of metaphysical reflection—whether idealist or empiricist—dedicated to contemplating either the world of ideas or the empirical world.

2. **The active orientation**, which viewed philosophy and science as dynamic activities.

   Among the latter group, two major currents can be distinguished: (a) those who consider philosophy and science as *social action*, as in *modern materialism* and theories of *social change*; and (b) those who understand philosophy as a specific type of *scientific activity*, as in *logical positivism* and *neopositivism*. Both

perspectives converge in conceiving philosophy not as passive speculation but as a form of productive activity embedded in the process of knowledge creation and societal transformation.

[In essence, social philosophies oriented toward social change propose large-scale social experiments in transformation—processes akin to those that occurred during the English Revolution, the American Revolution, the French Revolution, the Russian Revolution, and the Chinese Revolution. Each of these revolutionary movements extended their impact far beyond national boundaries, leaving a profound mark on global history and shaping the evolution of how we understand social and international relations. Similarly, economic revolutions such as the Industrial Revolution—and, more recently, the AI Revolution—can be seen as large-scale economic experiments with significant social and global consequences.]

101.10. The Professionalization of Scientific Research in the Twentieth Century

From the twentieth century onward, scientific inquiry underwent an unprecedented transformation: it became a *professional activity* institutionalized within states, universities, and private corporations. Research was no longer an individual or amateur pursuit but a structured and organized enterprise. Modern scientific investigation is now carried out by *public and private institutions*, including *universities, research agencies, and international organizations*, all operating under coordinated programs led by prominent scientists and research directors.

This phenomenon—uncommon before the twentieth century—became the norm in the modern era. The first large-scale research agencies were often established during *World War I* and *World War II* for the development of new technologies and weapons. After the wars, these institutions evolved into major centers for *space exploration*, *nuclear research*, and *technological innovation*. Among them, the *CERN* (European Organization for Nuclear Research) in Switzerland became a paradigmatic example of international scientific cooperation.

[Our project represents another example within the field of top-classified military research involving satellite technologies. In our specific case, however, the paradigm carries a deeper significance: we are developing cutting-edge military AI and cyborg robotics through a quasi-experimental model conducted in plain sight but under classified protection. From our perspective, this experience will establish new trajectories in the field of AI research. Since the very beginning of the AI Revolution at Bletchley Park, military artificial intelligence has remained confined within secure facilities. Yet, once our project reaches international institutions, this technology will become fully accessible to humanity as a whole.]

101.11. Global Institutions and the Expansion of Research Systems

The twentieth century also witnessed the emergence of *global research governance* through international institutions and networks. Organizations such as *UNESCO* (United Nations Educational, Scientific and Cultural Organization) and the *World Health Organization (WHO)* developed independent and coordinated global research programs. Similarly, international agencies like the *OECD*, through its *PISA reports*, and financial institutions such as the *International Monetary Fund (IMF)* and the *World Bank* established research departments dedicated to social, economic, and educational analysis. Even large *non-governmental organizations (NGOs)* now maintain research units that produce data and guide policy recommendations.

Parallel to this institutionalization, the private sector also embraced the scientific model through the creation of *Research and Development (R&D)* departments. From the late twentieth century onward, these became standard components of corporate structure, especially in fields such as *biotechnology, robotics, renewable energy, information technology, communication, and transport systems*. This professionalization of research reflects the culmination of a long historical evolution—from passive observation to active experimentation, from contemplation to praxis, and finally, to the organized, global, and institutional activity that defines contemporary science.

101.12. Methodology as a Discipline Derived from the Theory of Knowledge

Methodology, in its broadest sense, is a discipline deeply dependent on the *theory of knowledge*—that is, *gnoseology*. However, while gnoseology encompasses the entire domain of human knowledge, methodology deals only with a specific subset: the study of the *methods* by which *scientific knowledge* is produced. The theory of knowledge investigates not only the mechanisms by which science generates truths but also the broader processes by which human beings come to understand *life itself*, *their own existence*, and *the nature of the universe*. In this sense, gnoseology underpins the philosophical inquiry into meaning—addressing questions such as whether life has purpose and what role humanity plays in the cosmos. Therefore, the theory of knowledge forms a foundational part of both *cosmology* and *anthropology*, while simultaneously providing the conceptual groundwork upon which methodology is constructed.

101.13. Methodology and Its Relation to Epistemology

Similarly, methodology may be regarded as a *component* of *epistemology*, though not synonymous with it. Epistemology encompasses a much wider intellectual field, concerned with the overall structure, justification, and development of scientific systems of thought. While methodology focuses on the techniques and principles of scientific investigation—the "*how*" of knowledge—epistemology seeks to understand the "*why*" and "*what*" of knowledge itself. It offers a *global and holistic* vision of science, exploring its internal coherence, its conceptual evolution, and its philosophical implications. Methodology, then, can be seen as the operational arm of epistemology, responsible for translating epistemological principles into practical research models within specific scientific contexts.

101.14. The Cartesian Foundation of Method in *Impossible Probability*

Within the ongoing debate about the existence of a *general scientific method* capable of being developed into *particular methods* across analytic and synthetic sciences, the theory of *Impossible Probability* adopts a clear stance aligned with the *Cartesian tradition*. It defends the existence of a universal *scientific method*—namely, the *deductive method*. As detailed in *Introduction to Impossible Probability: Statistical Probability or Probability Statistics*, particularly in its concluding sections, the Cartesian method of deduction applies equally to *analytic sciences* and *synthetic sciences*, though in the latter it takes the form of the *hypothetico-deductive method*. According to this framework, *deduction* is the essential mode through which ideas are generated and become the *objects of analysis*. These ideas are provisionally accepted as true only after having undergone *rational criticism*—a systematic process of logical evaluation that always admits a *margin of doubt* proportional to the *margin of error* allowed by critical reason. Truth, therefore, in the Cartesian and *Impossible Probability* perspective, is never absolute but *rationally provisional*: it is valid until refuted through superior reasoning or empirical contradiction.

101.15. The Application of the Hypothetico-Deductive Method in the Sciences

The *hypothetico-deductive method* functions as the bridge between philosophical deduction and the practical methodologies of specific sciences. Each scientific discipline applies rational criticism according to its own operational framework. For instance:

- In the **experimental method**, rational critique examines whether observed data show significant variations that justify hypothesizing causal or probabilistic tendencies.
- In the **comparative method**, criticism evaluates whether comparative elements reveal consistent relational patterns or divergences.

- In the **historical method**, rational analysis identifies whether chronological or causal sequences exhibit logical continuity or transformation.

In all these cases, the deductive structure of scientific reasoning underlies the evaluation process: hypotheses are formulated deductively, tested empirically, and validated provisionally through rational consistency and evidential coherence. Thus, *Impossible Probability* conceptualizes scientific progress as a continuous dialectic between *deductive formulation* and *rational verification*.

101.16. Methodological Compatibility and the Debate Between Quantitative and Qualitative Approaches

When considering whether methodology should be defined as the study of *compatibility between research methods and types of investigation*, it is important to note that this debate primarily concerns *social sciences* rather than *natural sciences*. During the modern era, *natural sciences* reached broad consensus that only *quantitative methods*—those grounded in measurement, mathematics, and experimentation—could yield reliable discoveries. This agreement owes much to the contributions of modern science from *Copernicus* to *Newton*, and especially to the foundational role of *Roger Bacon's experimental method*.

In contrast, the *social sciences* have, throughout the twentieth century and into the twenty-first, remained divided over the methodological question of whether their disciplines should primarily employ *qualitative* or *quantitative* approaches. The absence of a unified paradigm has led social science to revisit, at the beginning of the twenty-first century, many of the same epistemological questions that occupied it in the nineteenth.

101.17. The Challenges Facing the Social Sciences: Quantification and Ideology

Two principal reasons explain why the social sciences have not achieved the same level of consolidation as the natural sciences during the twentieth century:

1. The **lack of consensus on quantitative methodologies**, and

2. The **lack of agreement on how ideological variables influence scientific construction**.

While natural scientists were able to emancipate their disciplines from metaphysical and theological constraints—symbolized by the triumph of *heliocentrism* over *geocentrism* and *Darwinian evolution* over *creationism*—social scientists continue to grapple with methodological and ideological divisions. The progress of the natural sciences was made possible because they successfully synthesized *quantitative methods* with a sustained struggle against *mysticism* and *spiritualism*. Today, few question the foundational discoveries of modern natural science, even though they were initially resisted by powerful institutions such as the Church, empires, and nation-states.
By contrast, the social sciences, having emerged much later, have yet to achieve a comparable consensus. Their continued fragmentation—between qualitative and quantitative approaches, and between empiricism and ideology—reveals that the unification of method and the rational overcoming of dogma, which enabled the success of the natural sciences, remains an *unfinished project* within the domain of social science.

101.18. Conclusion: Methodology as the Rational Structure of Scientific Knowledge

In summary, methodology occupies an intermediate and foundational position between gnoseology and epistemology. It derives from the theory of knowledge, forms part of epistemology, and operationalizes philosophy into concrete scientific action. From the *Impossible Probability* standpoint, methodology is not merely a collection of procedural techniques but the *rational architecture* through which scientific truth is constructed and continuously revised. Its deductive foundation, inherited from the Cartesian model, sustains the unity of the sciences—analytic and synthetic alike—while its adaptation across disciplines ensures the pluralism necessary for scientific progress. Ultimately, methodology represents the dynamic equilibrium between the *ideal of reason* and the *empirical reality* of investigation, guiding the continuous evolution of knowledge from hypothesis to understanding, from deduction to truth.

101.19. The Contemporary Methodological Debate and the Synthesis of Sciences

In contemporary methodology, one of the central debates concerns the identification of the *most appropriate method* according to the *typology of research*. Within the framework of *Introduction to Impossible Probability: Statistical Probability or Probability Statistics*, the position consistently upheld is the necessity to *overcome the dichotomy* between *natural sciences* and *social sciences*. Both should be treated as *synthetic sciences* and approached under a *unified scientific method*: the *hypothetico-deductive method*. This method, applicable to all synthetic disciplines—whether natural or social—should employ *quantitative procedures* as the structural foundation of scientific reasoning. Within this model, the method is operationalized through its corresponding specific applications: *experimental, [quasi experimental]*, *comparative*, *historical*, or others, depending on the domain of research.

The *Impossible Probability* framework proposes a *synthetic conception of scientific method*, in which *quantitative analysis* is integrated with the *critical understanding of ideological and political variables*. The resulting synthesis occurs within *critical reason*—the epistemological structure that governs the acceptance, rejection, or revision of hypotheses. In this sense, *scientific policy* is not external to science but an internal criterion of rational evaluation, ensuring that the process of hypothesis formation remains both *empirically valid* and *ethically conscious*.

101.20. Methodology as the Study of Paradigmatic Synthesis

Regarding the question of whether methodology should be understood as the study of the *methods belonging to different paradigms or scientific models*, *Introduction to Impossible Probability* advances a position of *synthetic integration*. It proposes that instead of choosing among the historical paradigms of philosophy and science, one should *synthesize their most productive aspects*. Accordingly, following the logic of *positivism* and *neopositivism*, *Impossible Probability* argues for the *equalization of the research method* across all synthetic sciences, advocating the application to the social sciences of the same *hypothetico-deductive* models that have produced major advances in the natural sciences.

In this framework, the study of all synthetic sciences—whether natural or social—must begin with *positive facts*, which are then subjected to *rational criticism*. This rational critique, performed through *critical reason*, integrates not only the analysis of empirical data but also the evaluation of *ideological and political variables*. Such integration constitutes what the theory defines as *scientific policy*: the rational-ethical regulation of knowledge production.

101.21. The Eclectic Foundation of *Impossible Probability*

Because it begins with the necessity of applying *rational criticism* to *positive data*, the theory of *Impossible Probability* already presupposes a *synthesis between positivism and critical rationalism*. However, it goes further: by incorporating *ethical and moral dimensions*—that is, by recognizing the political and ideological implications of knowledge—it redefines critique itself as a *form of praxis*. This means that rational critique is not a purely contemplative operation but an *active transformation* of knowledge within reality.

In doing so, *Impossible Probability* synthesizes *modern materialism* with *positivism* and *critical rationalism*. It thus stands as an *eclectic theory* that selects and integrates the most constructive principles from each of these traditions:

- From *positivism*, it adopts the reliance on empirical facts and the primacy of observation.
- From *critical rationalism*, it inherits the logic of rational doubt and provisional validation.
- From *modern materialism*, it incorporates the idea that knowledge emerges from praxis—the unity of thought and action.

This synthesis situates *Impossible Probability* as both a methodological and philosophical system, capable of uniting empiricism, rationalism, and materialism under a single epistemological architecture.

101.22. The Universal Recognition of the Deductive Method

The operational form of this synthesis is the *universal recognition of the deductive method* as valid for *all sciences*—both *analytic* and *synthetic*. Within the synthetic sciences (natural and social alike), deduction takes the form of the *hypothetico-deductive method*. The central analytical instrument for the development of this method is *statistical probability*—or, equivalently, *probability statistics*.
In this model, *statistics and probability* occupy a unique dual position: they are *analytic disciplines* by virtue of their mathematical nature, but when applied to real-world phenomena, they become *synthetic methods* of inquiry. Thus, they form the crucial interface between pure analysis and empirical synthesis, making possible the construction of rational hypotheses grounded in numerical representation and verifiable data.

101.23. Analytical and Synthetic Dimensions of Statistics and Probability

From the standpoint of *Impossible Probability*, statistics and probability possess two distinct but complementary dimensions:

1. **As mathematical disciplines**, they belong to the analytic domain. Here, research focuses on the development of *new theories and models* within the formal structure of mathematics. Progress in this field can occur only through *deductive reasoning*—that is, by deriving new models and formulas from the internal analysis of the mathematical properties of probability and statistics.

2. **As applied methods**, statistics and probability operate as synthetic tools. Their application belongs to the domain of *applied research* across synthetic sciences—whether natural or social. In this context, they are employed to develop new theoretical models and hypotheses that describe or infer patterns within empirical data.

In applied research, statistical and probabilistic methods yield two kinds of *synthetic propositions*:

- **Descriptive propositions**, which quantify and represent observed phenomena; and
- **Inferential propositions**, which extrapolate from samples to general laws or tendencies.

Through this dual function—analytic in structure, synthetic in application—statistics and probability embody the methodological synthesis proposed by *Impossible Probability*: the unification of *deductive reasoning*, *empirical verification*, and *rational critique* as the essential foundations of scientific knowledge.

101.24. Descriptive Synthetic Propositions: Quantitative Depiction of Empirical Reality

Descriptive synthetic propositions are those that *represent empirical reality* through *quantitative data* obtained by the application of *quantitative methods*. These methods operate in two principal stages. First, **measurement**, which translates qualitative aspects of reality into measurable quantities; and second, the application of a **mathematical method**, among which *statistics* and *probability* occupy a central place. Within these, *descriptive statistics* provides a systematic framework to depict what occurs in the observable world, offering a *numerical portrait* of empirical phenomena. In this sense, descriptive synthetic propositions do not infer or predict but *describe and structure* the information derived from observation. They convert data into an organized form of knowledge, allowing the researcher to identify frequencies, averages, dispersions, and correlations. Descriptive synthesis is therefore the *first level of quantitative understanding* of reality: it captures how things are, providing the empirical foundation upon which later inferential reasoning can be built.

101.25. Inferential Synthetic Propositions: From Observation to Generalization

Inferential synthetic propositions, by contrast, move beyond the description of observed phenomena to establish *relations, patterns, and generalizations* applicable to a broader range of cases. They allow the *inference* from a limited set of observed situations to the

entire possible universe of analogous or similar situations. In other words, inference consists of the *extrapolation* or *generalization* of particular empirical data to universal or probabilistic propositions.

The process of inference can take two main forms: *inductive* and *deductive*. Both aim to extend knowledge from what is known to what is possible, but they differ in the logical direction and in the role of hypothesis formulation.

101.26. Inductive Inference: The Generalization of Constants

When inference is *inductive*, it proceeds from empirical observation toward generalization. From a set of particular cases or situations, the researcher identifies a *constant*—a recurring relation or property—and generalizes it to all possible cases within the universe of study. Inductive inference thus assumes that what is true for the observed sample will hold for the entire class of analogous cases, provided that no contradictory evidence appears.

This process corresponds to the *empiricist* tradition and has been historically essential to the formation of hypotheses in the natural and social sciences. However, it lacks the logical certainty of deduction: its validity depends on the degree to which the observed regularities remain stable across broader domains. Induction, in the framework of *Impossible Probability*, represents the *descriptive-to-generalizing stage* of reasoning—necessary but incomplete without the complement of rational critique and deductive contrast.

101.27. Deductive Inference: Rational Critique and the Validation of Hypotheses

In *deductive inference*, reasoning proceeds in the opposite direction: it begins with a *hypothesis* formulated as the synthesis of prior ideas, theories, and new information obtained from empirical observation. The purpose of inference in this case is to *validate* the provisional truth of the hypothesis within a series of observed situations. This validation requires the construction of *models of hypothesis testing*, which in *Impossible Probability* are understood as *models of rational critique*.

Such rational critique operates through *statistical probability*—or *probability statistics*—and is expressed through *statistical tests* designed to evaluate the coherence between the hypothesis and the empirical data. Thus, deduction transforms the hypothesis into a logical structure subject to numerical validation. The inference is provisional, as every hypothesis remains valid only within the limits defined by *critical reason* and the *accepted margin of error*.

101.28. The Analytical Nature of Statistics and Probability

Statistics and probability, as *mathematical disciplines*, belong to the *analytic sciences*. Their development depends entirely on *deductive reasoning* and the systematic construction of mathematical relationships. Within the realm of *synthetic sciences*, however, statistics and probability function as *particular scientific methods*—that is, as applied techniques through which the *general scientific method* of synthetic sciences, the *hypothetico-deductive method*, is operationalized.

This dual character—analytic in nature, synthetic in application—makes statistics and probability the *logical core* of the scientific process. They transform mathematical deduction into empirical verification, mediating between abstract reasoning and observable phenomena. Hence, they serve as the foundational bridge between *theory* and *experience*, allowing science to articulate rational models with empirical realities.

101.29. The Analytical Method of *Impossible Probability*: The Syllogism of the Tendency

The *analytical method* for the development of *statistical probability* or *probability statistics*, as conceptualized within the theory of *Impossible Probability*, is known as the **Syllogism of the Tendency**. This method represents a *logical analysis of tendencies*, derived from the observation of quantitative behavior in statistical and probabilistic data. The term “syllogism” is employed because the analytical reasoning follows a *deductive syllogistic structure*: general premises about tendencies lead to specific mathematical conclusions, forming a coherent deductive chain.

The *Syllogism of the Tendency* thus constitutes the *logical foundation* of the analytical study of probability. By observing the mathematical patterns and trends within statistical distributions, the researcher deduces structural relationships that form the basis of new quantitative models. This analytical method is both philosophical and mathematical: it systematizes the deductive logic underlying empirical variation.

101.30. Quantitative Methods Derived from *Impossible Probability*

Building on the Syllogism of the Tendency, *Introduction to Impossible Probability: Statistical Probability or Probability Statistics* develops an *innovative mathematical model* of statistics and probability that, when applied to synthetic sciences, gives rise to several *quantitative methods*:

1. **The Second Method**.
2. **The Impact of the Defect**.
3. **The Effective Distribution**.
4. **Ranking Studies**.

Through these models, *Impossible Probability* establishes a unified and deductive framework capable of integrating mathematics, philosophy, and empirical observation into a single methodological architecture—an architecture that transforms the logic of tendencies into the logic of scientific truth.

This augmented translation is based on the post
published in *https://probabilidadimposible.blogspot.com/*,
On 23 August 2014,
Rubén García Pedraza
imposiblenever@gmail.com

102.Measurement

102.1. Measurement as the Transformation of Qualitative Properties into Quantitative Factors

The *measurement* of a quality in a subject or option represents the process by which a *qualitative property* is transformed into a *quantifiable factor*, suitable for inclusion in *mathematical operations*. This transformation allows the conversion of abstract or descriptive attributes into *positive data*, which can then be employed for the *description*, *inference*, or *prediction* of phenomena in the sciences. Measurement thus functions as a bridge between the qualitative and the quantitative, between subjective observation and objective analysis. Through quantification, science transforms experiential knowledge into measurable units, enabling systematic study and reproducibility.

102.2. Analytical and Synthetic Sciences: Two Complementary Domains

The principal distinction between *analytical* and *synthetic* sciences lies in their objects and methods of study. *Analytical sciences*—such as *logic* and *mathematics*—are devoted to the *formal analysis of language and structure*. Their object of inquiry is not empirical reality but the *forms* through which reasoning and description occur. By contrast, *synthetic sciences* are *empirical* in nature; they study the *factual phenomena* that occur in the observable world. However, they rely on analytical instruments—especially mathematical reasoning—to analyze empirical data. Hence their name, "synthetic": they are a *synthesis* of *formal* (analytical) and *factual* (empirical) elements. In this way, synthetic sciences occupy an intermediate position between pure abstraction and empirical verification, applying the precision of analytical reasoning to the complexity of the real world.

[This is the foundation of Artificial Research by Deduction, the synthesis of data and mathematical forms, matching data and equations.]

102.3. The Rise and Triumph of Quantitative Methods in the Natural Sciences

Within synthetic sciences, the *most objective method* of study is the application of *mathematical techniques*, commonly referred to as *quantitative methods*, in contrast to *qualitative theories*. For centuries, natural science debated the legitimacy and necessity of quantitative approaches. Figures such as *Johann Wolfgang von Goethe* in the nineteenth century defended qualitative science, emphasizing the descriptive richness of phenomena. However, such approaches remained marginal, as an overwhelming consensus emerged that *quantitative methods* provide the most reliable foundation for scientific progress.

This consensus explains the extraordinary advances of the natural sciences. By adopting mathematical formalisms and quantifiable models, natural sciences achieved precision, reproducibility, and predictive power.

102.4. Quantification in the Classical Paradigms of Natural Science

Among the natural sciences, the paradigmatic fields have traditionally been *astronomy*, *physics*, and *biology*. The mathematical formalization of knowledge appeared early in astronomy and physics, dating back to *Eudoxus of Cnidus* and later *Ptolemy*, *Galileo*, and *Newton*. In *biology*, however, the systematic use of mathematics arrived later, with *Gregor Mendel*, who in the nineteenth century employed *statistical methods* to formulate the *laws of heredity*.

This historical process illustrates a key transformation: as each discipline incorporated mathematics into its methodology, it moved from descriptive observation to *synthetic quantification*, from empirical description to analytical modeling.

102.5. The Continuing Methodological Debate in the Social Sciences

In the *social sciences*, the debate over the validity and scope of *quantitative methods* remains unresolved. While *economics* early on recognized the indispensability of mathematical modeling, other social disciplines—such as sociology, anthropology, or political science—have shown persistent divisions regarding the adequacy of quantitative versus qualitative methodologies.

Nevertheless, due to the influence of *positivism* and *modern materialism*, which applied statistical and mathematical formulas to the study of social and economic relations, significant schools of thought have emerged in favor of quantification. Yet, an *unanimous consensus* has not been reached. The social sciences continue to oscillate between two methodological poles: the desire for mathematical rigor and the recognition of the complexity and subjectivity inherent in social reality.

102.6. The Scientific Value of Quantitative Methods

The value of *quantitative methods* lies in their *reliability and reproducibility*. Although no scientific measurement can claim absolute certainty, quantification enhances the *comparability*, *contrastability*, and *inferential validity* of findings. It allows for *extrapolation* and the construction of *generalizable laws* from particular observations. Quantitative analysis transforms science into a *universal language* of verification, enabling collaboration across disciplines and contexts. Yet, it always remains bound to the epistemological and ethical framework of *scientific policy*, which defines the accepted limits of accuracy, error, and uncertainty.

102.7. Conditions for Quantitative Research: The Necessity of Empirical Foundations

For a synthetic study to be legitimately *quantitative*, it must satisfy certain conditions—the most fundamental being that its object of study is *empirical*. For example, if one seeks to study the *nature of the human spirit*, it must first be defined in empirical terms and supported by observable evidence. Otherwise, such a study would not qualify as

scientific.

In the absence of empirical data, the *spirit* would remain a *metaphysical concept*, valid only within non-scientific domains such as *poetry*, *oratory*, or *philosophy*. Science demands observability and measurability; phenomena that cannot be operationalized in these terms fall outside the boundaries of empirical investigation.

102.8. Metaphysical Concepts and Their Evolution into Empirical Science

Even though metaphysical notions such as "*the human spirit*" or "*forces of nature*" lack empirical validity, they have historically influenced scientific language, largely due to the legacy of *idealism* in *deductivist philosophy*. Expressions like "forces of nature," common in scientific discourse, have metaphysical origins. From a *positivist* or *empiricist* standpoint, such expressions are meaningful only when specified: for instance, *gravitational force*, *magnetic force*, *meteorite impact force*, or *wind force*. Paradoxically, it is from these *metaphysical abstractions* that philosophy often derives new *empirical definitions*, enabling the natural sciences to evolve into genuinely *synthetic disciplines*. Thus, even unscientific ideas play an indirect but formative role in the conceptual evolution of science.

102.9. From the Philosophy of Spirit to Scientific Psychology

Although the *human spirit* itself is not an empirical object, the philosophical reflections surrounding it—from classical antiquity through modernity—laid the foundations for the emergence of *scientific psychology* in the nineteenth century. *Wilhelm Wundt*, often considered the father of modern psychology, transformed introspective speculation into empirical observation through controlled experimentation. Today, psychology stands as an empirical science, though some schools continue to defend *qualitative methodologies*.

The introduction of *quantitative methods* in psychology has led to major advances—from *learning theory* to *instructional psychology*. Yet resistance persists among those who fear that quantification may reduce the richness of subjective experience. Nonetheless, just

as in medicine, quantitative methods in psychology allow for *statistical description of cases*, *probability estimation of phenomena*, and *experimental testing of interventions*—results that can later be individualized according to specific contexts.

102.10. The Ethical-Political Dimension of Scientific Policy in Health Sciences

In recent decades, the *health sciences*—notably *medicine* and *psychology*—have suffered reputational challenges due to the influence of *profit-driven pharmaceutical policies*. This phenomenon illustrates the *political and ideological nature of science*: methodology is never purely neutral but shaped by institutional and economic interests. However, *quantitative research* in medicine and psychology need not be limited to *pharmacological* studies.

Experimental research into *food properties*, *medicinal plants*, *physical activity*, or *lifestyle habits* in disease prevention and treatment constitutes equally legitimate quantitative science. These forms of research reclaim the *ethical purpose* of science as a means of improving collective well-being, beyond corporate profit.

102.11. The Future of Quantitative Health Sciences: Biotechnology and Rationalization

Modern *medicine* and *psychology* are undergoing a profound transformation through *biotechnology*, which is making health sciences increasingly *positive* and *rational*. Biotechnology introduces new forms of measurement, genetic modeling, and computational analysis that extend the reach of scientific empiricism. The fusion of biology, mathematics, and artificial intelligence redefines health research as an integrative field in which *data, models, and ethics* converge.
In this sense, the biotechnological revolution represents the culmination of the positivist dream: to unite empirical observation and rational deduction in the service of human life.

102.12. From Metaphysics to Astrobiology: The Scientific Transformation of Extraterrestrial Studies

Finally, consider the case of the *extraterrestrial phenomenon*. For centuries, it was a subject of metaphysical speculation and mystical interpretation, giving rise to the modern mythology of *ufology*. However, this field has since undergone a process of *scientific reformulation*. The establishment of the *SETI (Search for Extraterrestrial Intelligence)* program in the United States marks a paradigm shift: the transition from mythic speculation to *empirical astrobiology*.

SETI represents the scientific institutionalization of what was once a metaphysical question—the search for intelligent life beyond Earth. Recast within the framework of *astrobiology*, the inquiry now operates according to empirical parameters: observation, data analysis, probability modeling, and technological experimentation. This transformation epitomizes the methodological evolution of science itself—from metaphysical curiosity to rational investigation, from the imaginary to the measurable.

102.13. The Limits of Science: The Absence of Empirical Records

The fundamental reason why certain concepts—such as the *human spirit*, the *forces of nature* in the abstract, or the *possibility of extraterrestrial civilizations* as defined by *ufology*—cannot be studied scientifically lies in the *absence of empirical records* for these notions. In the case of the *human spirit* and the *forces of nature*, their persistence in scientific or philosophical discourse originates from *metaphysical traditions*. The *idealist metaphysics* of *Plato* posited the existence of the spirit as an immaterial essence, while the *empiricist metaphysics* of *Aristotle* defended the reality of natural forces as active principles within nature. These metaphysical inheritances still appear today in scientific and philosophical writings, often as *metaphors or allegories* that describe human or natural behavior rather than empirical realities. Similarly, *ufological theories*—which claim the existence of extraterrestrial civilizations visiting Earth—belong to the *tradition of speculative science fiction* rather than to empirical science, tracing their origins to authors such as the British novelist *H. G. Wells*,

whose *The War of the Worlds* popularized extraterrestrial imagination within modern culture.

102.14. The Role of Non-Empirical Hypotheses within Empirical Theories

Nevertheless, the empirical sciences may occasionally contain *theoretical hypotheses* for which *direct empirical correlates* do not yet exist, without ceasing to belong to the domain of science. This occurs only when such hypotheses are embedded within a *broader theoretical system* whose remaining components *do* possess empirical verification. In other words, a theory may include *a limited number of unverified hypotheses*—provided that the *majority of its propositions* can be empirically tested. Such non-empirical hypotheses are admissible only when it is possible to define *conditions of potential verification*: either by specifying the *physiological or technological limitations* that prevent current testing or by identifying the *future conditions* under which empirical evidence might become accessible. A paradigmatic example is the *concept of infinity* in certain *astrophysical cosmologies*, which, although unobservable in itself, remains meaningful within a mathematical and theoretical framework that generates verifiable predictions.

102.15. Criteria for the Scientific Acceptance of Theoretical Hypotheses

For a theory containing both testable and untestable hypotheses to be considered scientific, the *ratio* of *empirically verifiable propositions* must be *significantly greater* than that of non-verifiable ones. The untestable hypotheses may remain provisionally included only if they are *logically consistent* with the verified hypotheses and if their *conditions of verification* are clearly defined.

Thus, a theory achieves scientific legitimacy when the *core of its reasoning* can be empirically confirmed, even if certain elements remain speculative due to current technological or perceptual limitations. This rational tolerance allows science to maintain its *progressive character*: to include hypotheses that extend beyond current empirical reach while retaining a disciplined commitment to verification.

102.16. From Metaphysical Origins to Empirical Disciplines

Just as the *metaphysics of the human spirit* and the *forces of nature* gave rise to *modern psychology* and *modern physics* respectively, the *metaphysical beliefs of ufology* have evolved into the *scientific field of astrobiology*. Not every concept born outside scientific methodology must remain unscientific forever. Once a field abandons its *non-verifiable propositions* and redefines its object in *empirical and rational* terms, it becomes assimilable into scientific practice.

This evolution demonstrates that science often originates in *philosophical speculation*, but advances only when it transforms speculation into *measurable phenomena*. The progress of knowledge depends not on rejecting metaphysical imagination altogether, but on *purifying it*—limiting its scope to that which can be rationally and empirically defined.

102.17. Astrobiology and the Empirical Reformation of the Extraterrestrial Question

Modern *astrobiology* exemplifies this transformation. It redefines the question of extraterrestrial life in *empirical terms*: given a set of measurable environmental conditions—such as *temperature, mass, pressure, atmosphere, and geology*—it is possible to calculate the *probability* of life, even if only microbial, existing on other planets or satellites.

With the accumulation of astronomical data from numerous celestial bodies, scientists can now *estimate the likelihood* of life under specific empirical conditions. Thus, astrobiology departs from the metaphysical or mystical assumptions of ufology and enters the domain of *synthetic science*, where hypotheses are framed, measured, and tested within observable reality.

102.18. Toward an Empirical Redefinition of the Human Spirit and Natural Forces

In contrast, the *human spirit* remains a non-empirical concept, but through *empirical redefinition*, aspects traditionally attributed to it can be studied scientifically. If we define its components—such as *rational intelligence*, *emotional intelligence*, and *psychomotor capacity*—and construct appropriate *measurement scales*, then quantitative research becomes possible. Studies on intelligence, emotion, and psychomotor behavior exemplify how abstract notions of "spirit" can be reframed as measurable psychological constructs.

Similarly, the *forces of nature*, though vague in their metaphysical form, become scientifically meaningful when specified as *distinct forces*—gravitational, magnetic, kinetic, or meteorological—each defined by measurable units. By developing *quantitative scales* for each phenomenon, physics and astrophysics attain their current mathematical precision. In both cases, the transition from *metaphor to measurement* marks the birth of true science.

102.19. The Prerequisite of Empirical Definition for Scientific Research

The *first prerequisite* of any scientific inquiry is the *possibility of defining factors as empirical facts* susceptible to measurement. Without this condition, no study can claim scientific status. In *descriptive studies*, variables are defined according to the type of description sought, without the necessity of prior hypotheses. In *inferential or hypothetico-deductive studies*, variables must be explicitly defined within the *hypothesis itself*, along with any other variables influencing the model. These variables may be subject to *statistical control*, *laboratory manipulation*, or other empirical procedures required by the scientific design.

This principle establishes the boundary between *science* and *non-science*: only phenomena that can be *empirically defined, observed, and measured* fall within the scientific domain.

102.20. The Admissibility of Theoretical Assumptions and the Principle of Rational Proportion

Within a scientific theory, a *very limited number of purely theoretical assumptions*—for which precise measurements are temporarily impossible—may be tolerated, but only under two conditions:

1. That their *conditions of possible measurement* are explicitly stated; and
2. That the *reasons* for their current inaccessibility—whether *physiological* or *technological*—are clearly understood.
3. The example of *infinity* in mathematics and astrophysics illustrates this: while infinite magnitude cannot be empirically measured, it serves as a rational construct that supports demonstrable predictions.

However, the *number of untestable hypotheses* must always remain *minimal*, sufficient only to maintain the internal coherence of the theory. When the majority of a system's hypotheses are empirically verified and rationally consistent, even the untested ones can be *provisionally accepted* within the domain of science.

102.21. From Empirical Definition to Measurement: The Example of Rain

Once a *phenomenon* has been empirically defined and evidence of its *factual occurrence* is established, scientific activity becomes possible through the *measurement of variables*. To illustrate: suppose we wish to study the empirical behavior of *rain*. The first step is to define rain as an *empirical fact*—a recurring natural event observable under specific conditions. Next, we must identify the *occurrences* in which the phenomenon manifests and select a *sample* of such events for analysis. Measurement can then proceed in multiple ways:

- By studying the *magnitude* of rain (e.g., cubic meters of water per minute).
- By analyzing *fluctuations in intensity* during each rainfall episode or across multiple episodes.

- By recording the *frequency* of rainfall events within a given period. Alternatively, one may combine both magnitude and frequency—classifying each recorded event into discrete *categories of rainfall intensity* to study distributions and trends.

  Through such procedures, the empirical definition of a phenomenon transitions into quantifiable observation, and quantifiable observation into scientific explanation.

102.22. From Conceptual Abstraction to Empirical Science

The transition from metaphysical speculation to empirical science requires a rigorous process of *operational definition* and *measurement*. Only by converting abstract ideas into *observable variables* can knowledge enter the scientific domain. Whether studying psychological constructs, physical forces, or cosmic phenomena, the essential condition of science remains constant: *the existence of measurable facts*. Thus, the journey from *spirit* to *mind*, from *force* to *energy*, and from *ufology* to *astrobiology* exemplifies the same epistemological transformation: the evolution from *symbolic imagination* to *quantitative understanding*. Science advances not by rejecting the imaginative origin of ideas, but by grounding them in empirical reality, turning philosophical speculation into measurable truth.

102.23. Expanding Complexity: Correlations Between Phenomena and Environmental Conditions

The study of an empirical phenomenon such as *rainfall* can be made increasingly complex by examining not only the phenomenon itself but also its *correlations* with other *atmospheric or environmental variables*. Scientific analysis does not limit itself to the isolated measurement of a single factor; it seeks to discover relationships and interactions among multiple variables that co-occur in observable reality. For instance, rainfall can be analyzed in relation to humidity, temperature, air pressure, or geographical altitude, generating *correlational models* that explain not just the existence but also the

variability and predictability of the phenomenon. Through these correlations, quantitative analysis transcends simple description to form the foundation of inferential reasoning.

102.24. Types of Measurement in Empirical Variables

In *Introduction to Impossible Probability: Statistical Probability or Probability Statistics*, empirical measurement is classified according to three fundamental types:

1. **Measurement of intensity or magnitude** — the quantification of a quality's degree along a defined *measurement scale*, producing what is called a *direct score* for each event.
2. **Measurement of frequency or occurrence** — the counting of how many times a particular event occurs within a sample or period, producing the *frequency* of that event.
3. **Measurement of frequency by discrete magnitude categories** — the synthesis of both approaches, in which events are grouped into *discrete magnitude intervals*, and the frequency within each interval is computed.

Thus, *direct score*, *frequency*, and *frequency by category* represent the three basic modes of quantitative transformation of empirical data. Together, they allow the statistical and probabilistic modeling of both the *intensity* and *recurrence* of natural or social phenomena.

102.25. The Empirical Definition of Earthquakes as a Scientific Phenomenon

Consider the example of *earthquakes*. To begin a scientific study, one must first provide an *empirical definition* of the phenomenon: an earthquake is a *seismic process* caused by *tectonic movements* that produce measurable ground vibrations. Once this definition is established, the next step is to *identify all occurrences*—that is, all events that correspond to the definition of the empirical fact—and to perform *measurements* on those occurrences.

These measurements may take one of three forms, or a combination thereof:

- The **magnitude of earthquakes**, measured according to an established intensity scale (e.g., the Richter or moment magnitude scales).
- The **frequency of earthquakes**, counting the number of occurrences in a given area or period.
- The **frequency of earthquakes by magnitude categories**, where earthquakes are grouped according to discrete intensity intervals, and the number of events in each category is recorded.

This classification allows researchers to move from qualitative description ("there are many earthquakes") to quantitative understanding .

102.26. Direct Scores and Empirical Probability in the Study of Magnitude

When studying the *magnitude* of earthquakes, each event receives a *direct score*—its measured intensity on the chosen scale. The *empirical probability* of a given earthquake intensity is defined as the *ratio* between the magnitude of that specific event and the *sum of all magnitudes* recorded in the dataset. Symbolically:

$$p(x_i) = \frac{x_i}{\sum x_i}$$

where $x_i$represents the measured magnitude of each earthquake. This ratio expresses the *proportion* that each event contributes to the total sum of magnitudes, and proportion is the essential concept in empirical probability.

If all earthquakes in a given region have *the same magnitude*, regardless of whether that magnitude is high, low, or medium, the behavior of empirical probability will tend toward *the inversion of N*—that is, $1/N$—which is the definition of *theoretical probability*. In such cases, the empirical distribution approximates a condition of *perfect equality* across all

observed events. Conversely, when magnitudes vary significantly, the empirical probability distribution expresses the relative weight or dominance of certain intensities over others.

This model corresponds to a *universe of infinite options or subjects*, since each measurement represents a distinct and continuous variation of magnitude.

102.27. Frequency Studies as Models with Limited Options

The study of earthquakes *by frequency* instead of magnitude represents a *model of limited options*. In this case, what is measured is not the intensity of each event but its *occurrence count* within a defined spatial or temporal context. The *frequency* of earthquakes in a specific region equals the *total number of earthquakes* observed in that region.

Given a series of regions, the *empirical probability of earthquakes per region* is defined as:

$$p(x_i) = \frac{f_i}{\sum f_i}$$

where $f_i$is the number of earthquakes recorded in region i.
This approach transforms the phenomenon from a study of magnitudes (continuous variables) to one of occurrences (discrete variables), making it suitable for comparative and spatial analysis.

102.28. Frequency by Magnitude: Hybrid Quantitative Models

A third and more sophisticated approach combines the two previous ones—*frequency* and *magnitude*. Here, earthquakes are classified into *discrete magnitude categories* (e.g., 3.0–3.9, 4.0–4.9, etc.), and the *number of occurrences* in each category is measured. This produces a *frequency distribution by magnitude*, which can be graphically represented as a *histogram* or *empirical probability curve*.

Such hybrid models reveal not only how often earthquakes occur but also how their magnitudes are distributed across time or geography. This synthesis of *intensity and occurrence* captures both the *qualitative variability* and *quantitative regularity* of the phenomenon, fulfilling the methodological principle that the best empirical studies are those that *combine description, inference, and proportion*.

102.29. General Methodological Implications

The earthquake example illustrates the *universal logic* of measurement and probability in *Impossible Probability*. Every empirical study, regardless of field, proceeds from the same epistemological sequence:

1. **Definition of the empirical fact** — clear, observable, and measurable.
2. **Identification of occurrences** — determining when and where the phenomenon manifests.
3. **Selection of variables** — choosing which aspects to measure (magnitude, frequency, or both).
4. **Measurement** — transforming occurrences into numerical data.
5. **Statistical and probabilistic analysis** — establishing proportions, correlations, and theoretical tendencies.

This process constitutes the *rational skeleton* of all synthetic sciences. By converting facts into data, data into proportions, and proportions into laws, science constructs a measurable understanding of the universe—an understanding grounded in empirical observation, mathematical reasoning, and critical rationality.

102.30. Empirical Probability by Discrete Magnitude Categories

In the study of *earthquake frequency* by *discrete magnitude categories*, the *empirical probability* of earthquakes within a given category is defined as the *frequency of earthquakes in that category* divided by the *total frequency of all categories*. Mathematically,

$$p(x_i) = \frac{f_i}{\sum f_i}$$

where $f_i$represents the number of earthquakes recorded in category i. This formulation expresses the *proportionate probability* that an earthquake will occur within a particular intensity range, relative to all seismic events measured in the study. It is a foundational structure for probabilistic modeling in the empirical sciences, where discrete categorization allows the synthesis of statistical regularity and real-world variability.

102.31. Complex Multivariable Models

The study gains complexity when *additional variables* are introduced to capture the interaction between *seismic frequency*, *magnitude categories*, and *regional characteristics*. For example, one may study:

- The *frequency of earthquakes* by magnitude categories in regions situated along *volcanic fault lines*.
- Or more complexly, the *frequency of earthquakes* by magnitude categories across regions defined by *geological composition* (type of rock, mineral deposits, or presence of fossil fuels such as coal, gas, or petroleum).
- Additionally, one could analyze the *frequency of seismic events* in relation to *levels of industrialization, urbanization,* or *population density*.

Each new variable introduces an additional *dimension of correlation*, requiring a more detailed and multivariate statistical approach. Such research would necessitate defining every study area according to its *geological, demographic, or economic parameters* and then analyzing how the *frequency of earthquakes by magnitude category* varies within each type of region. In doing so, science constructs a model of *interdependent causality*, revealing how natural and human factors coexist in determining empirical phenomena.

102.32. Infinite and Finite Universes of Options in Empirical Models

In *Introduction to Impossible Probability: Statistical Probability or Probability Statistics*, studies that measure *the magnitude of individual earthquakes*—where the *empirical probability* is equal to the *direct score* of each event divided by the *sum of all direct scores*—are classified within *universes of infinite subjects or options*. Within a *magnitude scale*, every unit can be subdivided infinitely, allowing for an *infinite continuum of possible earthquake intensities*. In this model, the empirical universe is *open and continuous*:

$$p(x_i) = \frac{x_i}{\sum x_i}, N \to \infty$$

By contrast, in studies where frequency is analyzed according to *geographical zones*, the universe of options is *limited* to the number of predefined zones under observation. The probability of an earthquake in each zone equals the number of events in that zone divided by the total number across all zones. Any earthquake occurring outside the defined regions is excluded from the model.

Finally, in the case of *discrete magnitude categories*, the universe begins as *limited*—restricted to the number of categories—but because the *unit of measurement* is *infinitely divisible*, the number of possible discrete categories can, in theory, increase indefinitely. Thus, as the classification of categories approaches infinity, the model transitions from a *finite to an infinite universe of options*, reflecting the continuous nature of physical magnitudes within a discretized framework.

102.33. The Necessity of Quantitative Consensus for Progress in the Social Sciences

For the *social sciences* to achieve a level of advancement comparable to that of the *natural sciences*, a *universal consensus* on the validity and necessity of *quantitative methods* is indispensable. Quantification requires measurement, and measurement requires standardized scales. The progress of the natural sciences became exponential only after the international adoption of *homogeneous measurement systems*—notably, the *Metric System*—which replaced traditional local standards for distance, weight, and volume.

A similar *standardization of measurement and method* must occur in the social sciences to unify data interpretation and allow global comparability. Without such standardization, the fragmentation of methods will continue to hinder cumulative progress and cross-disciplinary synthesis.

102.34. Quantitative Globalization: Institutions and the Expansion of Measurement

Contrary to *postmodernist theories* that claim positivist and materialist paradigms have been surpassed, the reality of contemporary science demonstrates the opposite: *quantification in social research is expanding globally*. Today, countless *institutions and agencies*—public and private, national, transnational, and supranational—collect, analyze, and interpret *quantitative data* on social phenomena. Examples include:

- The *OECD's PISA report* on educational performance.
- Quantitative studies by the *World Health Organization (WHO)*, *International Labour Organization (ILO)*, *UNESCO*, *UNICEF*, *UNHCR*, *International Monetary Fund (IMF)*, and *World Bank*.
- Regional organizations such as the *European Union* and the *Organization of American States (OAS)*.

- International NGOs including *Amnesty International*, the *Red Cross*, and *Médecins Sans Frontières*.

Moreover, the rise of *Big Data* has revolutionized quantitative analysis: private corporations such as *Google, Amazon, Meta, Twitter, LinkedIn,* and *Apple* now generate continuous global statistics on *consumer habits, lifestyles, cultural trends,* and *social relationships* in real time. The sheer volume and immediacy of this data have transformed quantification itself into a new mode of planetary observation.

102.35. The Political and Ethical Dimension of Scientific Quantification

These globalized quantitative phenomena confirm the growing necessity of *measurement* across all fields of human activity—educational, humanitarian, economic, and social. The trend in the social sciences points unmistakably toward *quantitative integration*, and as methodologies mature, *international consensus* akin to that of the natural sciences will eventually emerge.

However, the main challenge for the social sciences does not lie in measurement itself—which is essential—but in the *recognition that all science, even positive science, is inherently political*. Scientific activity is guided and managed by *scientific policy*, which must integrate an understanding of the *social dimension of human nature*. The ultimate purpose of the social sciences is not private economic growth but the *sustainable development of equality and freedom*.

Scientific planning must therefore pursue the *promotion of liberty under real conditions of social equality*, harmonized with environmental sustainability. In this sense, the future of the social sciences depends not only on methodological precision but also on *ethical orientation*: the unification of *quantitative rigor* with *humanistic purpose*.

102.36. Conclusion: Measurement, Rationality, and the Social Function of Science

In conclusion, the path toward scientific maturity—whether in natural or social disciplines—requires the universalization of *measurement*, the institutionalization of

quantitative reasoning, and the recognition of *science as a social and moral enterprise*. The methodological foundations described in *Impossible Probability* show that quantification is not merely a technical procedure but a *philosophical act*: the conversion of empirical reality into rational form. When properly guided by ethical and political consciousness, the quantitative study of the world—be it earthquakes or economies—becomes the means through which humanity can pursue both *knowledge and justice* within a single coherent rational order.

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published in *https://probabilidadimposible.blogspot.com/*,
On 31 August 2014,
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103. The meaning of science

103.1. The Nature of Meaning and the Attribution System

Meaning can be defined as the concept or operation that a sign is understood or agreed to represent, within a given system of attributions. This system involves the assignment of a particular meaning to a particular sign, and such attribution may be **causal**, **correlational**, or **social** in nature. Among the various forms of attribution, the **scientific attribution** is considered the most accurate, exhaustive, and empirically verifiable, since it is grounded in methodological observation and reproducible inference.

A **meaning is conceptual** when the sign that represents it symbolizes a concept, and **operational** when the sign symbolizes an operation or process. For instance, the word *love* represents a concept associated with emotion or sentiment, while the mathematical symbol "+" represents the operation of addition. Hence, meaning arises both in abstract symbolic representation and in concrete procedural representation, depending on the epistemological framework in which it is defined.

103.2. Conceptualism and Operationalism: Two Epistemological Paradigms

The distinction between **concept** and **operation** has long depended on the philosophical school of thought that defines the function of signs. Some paradigms hold that the meanings associated with operations ultimately symbolize **the concept associated with the operation itself**. In this sense, every sign represents a concept — whether that concept is cognitive (knowledge-based), operational (action-based), or emotional (affective). This philosophical orientation is known as **conceptualism**.

Conversely, **operationalism** challenges this assimilation. According to operationalist theory, science is not primarily a collection of abstract concepts but rather a structured

set of **operations performed under conditions of control and neutrality** to achieve positive and verifiable results. In this view, **scientific meaning** is grounded in the reproducibility and functionality of actions, not in the metaphysical identity of concepts. Thus, while conceptualism emphasizes understanding through ideas, operationalism emphasizes understanding through controlled experimentation and measurement.

Regardless of whether one's starting paradigm is conceptualist or operationalist, the **genesis of language** inevitably involves a series of natural, cognitive, and social factors that transform perception into symbolic attribution.

103.3. Signs Beyond Language: Natural and Causal Attributions

A **sign** representing a meaning can take diverse forms and does not necessarily belong to a spoken or written language. For example, if the sun rises, it probably indicates that daylight is approaching. Similarly, the sight of an animal's footprint in a forest signifies that such an animal has passed through that location. If one possesses a taxonomy of footprints, one can even infer the species that left it. The footprint thus becomes the **symbolic trace** of the animal's passage — a physical sign of an event in reality.

Likewise, if days become longer, it means that summer is approaching; if they shorten, winter is near. Based on repeated observations, humans have historically inferred **patterns and meanings** about the natural world — predicting seasonal changes, rainfall, sowing, and harvesting periods within a certain **margin of error**. Through the repetition of observable phenomena and the recognition of regularities, humans built **causal and correlational meanings** that enabled interpretation, prediction, and later, linguistic abstraction.

The attribution by which the sunrise or the footprint of an animal signifies a probable phenomenon — daybreak or the presence of an animal — is therefore **causal or correlational**. The sign is understood as the probable cause or effect of another phenomenon. For example, the sun's appearance is a probable cause of daylight, though the actual brightness may vary depending on factors such as cloud cover, fog, or eclipses. Similarly, animal footprints are the probable effect of an animal's movement through that

area. This foundational causal reasoning underlies all early forms of meaning construction.

103.4. From Natural Signs to Symbolic Systems

Just as the sun or footprints function as **physical signs** of natural phenomena, **prehistoric cave paintings** representing celestial bodies or animals were **symbolic representations of natural signs**, constituting an early form of **cognitive and social construction of meaning**. These symbolic expressions marked a key anthropological step in humanity's evolution: the transformation of environmental perception into shared symbolic communication.

When a specific **phonetic combination** (in spoken language) or **symbolic sequence** (in written language) is socially assigned a meaning, the process of **language construction** begins. This process depends upon **social convention** — the collective agreement that connects sound or sign to meaning. This phenomenon is referred to as **social conventionalism**.

For example, in calculus, the decision to use Leibniz's notation (∫) rather than Newton's (fluxions) represents a **scientific convention** — a social agreement on efficiency, standardization, and communicative clarity within the language of science. Thus, language — whether natural or scientific — emerges as a balance between symbolic economy and shared understanding.

103.5. Meaning Construction as a Cognitive Function and the Evolution of Language

The **construction of meaning** is primarily a **psychological function**, but not one exclusive to humans. Depending on their level of intelligence, different species demonstrate the ability to attribute meaning to environmental stimuli — interpreting signs and causal relationships according to their **cognitive capacity**. More evolved species exhibit forms of **proto-linguistic behavior** or even full communication systems. For instance, **whales** use complex acoustic languages, and among animal communication systems, **human language** stands as the paradigmatic case due to its

immense expressive power — both **rational** and **emotional**. Within the rational dimension, **logical-mathematical language** represents the most precise and abstract level of linguistic expression.

Human language is the result of a **long evolutionary process**, beginning with **proto-languages** among early Paleolithic cultures. These primitive systems of vocal or gestural communication prefigured the later development of **spoken languages**, followed by the invention of **writing**, and consequently, **recorded history**. From there, symbolic thought evolved further into the first **logical-mathematical systems** of the ancient world — Pythagorean, Euclidean, Aristotelian, and the Hindu-Arabic numeral systems — all of which laid the epistemological foundations for **modern science**.

103.6. Mathematics as Dual Structure: Language and Science

Mathematics serves a **dual function** within the evolution of human knowledge. On one hand, it is an **independent scientific discipline** within the analytical sciences, requiring its own methods of **pure mathematical research** for internal development and theoretical progress. On the other hand, mathematics functions as a **universal language** for all other sciences — especially the synthetic ones — providing a formal system through which empirical observations can be expressed, modeled, and verified.

This dual role — as both **object of study** and **instrument of study** — grants mathematics a privileged epistemological position. It bridges the gap between concept and operation, unifying the **conceptualist and operationalist paradigms** under a single structure of meaning. In this way, mathematics becomes not only the most advanced human language but also the symbolic and operational foundation for all forms of scientific inquiry — and by extension, for the construction of **artificial languages of reason** in systems such as the **Global Artificial Intelligence**.

103.7. The Historical Construction of Mathematical Language

The historical process of constructing **mathematical language** must have evolved **in parallel with the construction of human languages**. As early societies gradually systematized the **social attribution of meanings** to linguistic signs, they necessarily developed symbolic systems to solve increasingly complex **quantitative and relational problems**. One of the earliest symbolic constructs was the **concept of number**, beginning with natural numbers, followed by the development of **basic algorithms** for addition, subtraction, multiplication, and division.

From these initial mathematical definitions arose one of the most essential **analytical sciences — mathematics** — and, within the philosophical domain, its natural correlate: **logic**. Both emerged as systems of formal reasoning that allowed humans to abstract, generalize, and structure relations independently of empirical reference. Thus, the historical formation of mathematical thought cannot be separated from the linguistic evolution of humanity, for both represent parallel processes of symbolization — one directed toward the world of **words and social meaning**, the other toward the world of **numbers and formal operations**.

103.8. The Origins of Logic: Natural and Scientific Dimensions

A clear distinction must be drawn between the **implicit logic** present in all linguistic systems — which emerges naturally through the evolution of language — and **logic as a scientific discipline**, whose origins date back to the beginnings of philosophy. For millennia, **Aristotelian logic**, characterized by its **linear structure** and syllogistic reasoning, dominated philosophical and scientific thought.

The **modern critique of linear logic** developed in parallel with the **critique of Euclidean geometry**. This correlation is not coincidental: Euclid represented the mathematical paradigm of Classical Greece, just as Aristotle represented its metaphysical paradigm. Both models — **Euclidean geometry and Aristotelian logic** — were linear, deductive,

and foundational to the scholastic worldview, serving as the cornerstones of Western rationality for centuries.

However, with the advent of modernity, new forms of thought emerged that opposed these classical paradigms. The **non-Euclidean geometries** of the nineteenth century and the **Hegelian dialectical logic** of the same era questioned the rigidity of linear systems, introducing curvature, contradiction, and synthesis into the very structure of thought. In this way, mathematics and logic evolved together toward **non-linearity and dialectical complexity**, setting the intellectual foundations for modern scientific rationalism and, eventually, for the theoretical models of *Impossible Probability*.

103.9. Logic and Mathematics in *Impossible Probability*

In *Introduction to Impossible Probability: Statistics of Probability or Statistical Probability*, mathematics is understood as both an **analytical science** and a **language applied to synthetic sciences**. The underlying logical structure of this model is explicitly **non-linear and dialectical**, synthesizing **dialectical materialism**, **positivism**, and **critical rationalism**.

Within this **dialectical logic**, the classical syllogism — composed of three phases (major premise, minor premise, and conclusion) — is reinterpreted through the **Hegelian triad** of **thesis, antithesis, and synthesis**. Consequently, *Impossible Probability* describes phenomena such as *subject or option* and *direct score or frequency* as **mathematical syntheses of the dialectic between subject and object**, merging the languages of **statistics and probability** into a unified rational framework.

The **permanent dialectic of opposites** manifests throughout the entire theory — in the distinction between **opposed universes** (infinite or finite), in the differentiation between **opposite types of studies** (equality or bias), and in the classification of **two types of models**: the **Normal model** and the **Omega model**. Thus, the mathematical and logical system of *Impossible Probability* stands as a synthesis of oppositional principles, harmonizing formal reasoning with empirical reality through dialectical structure.

103.10. Analytical and Synthetic Meanings

In coherence with the **classification of sciences** proposed by *Impossible Probability*, which distinguishes between **analytical** and **synthetic** sciences, one must also differentiate between **analytical meanings** and **synthetic meanings**.

This classification reveals the synthesis between **dialectical materialism** and **critical rationalism**. The analytical and the synthetic are placed in a relation of **opposition and identity**. They oppose each other insofar as analytical elements are **independent of empirical values**, while synthetic elements **depend on them**, synthesizing **analytical concepts** with **empirical factors**. Their identity emerges when we recognize that the **common foundation** of both types of science is **logic and mathematics** — the two universal forms of structured reasoning.

Therefore, analytical meaning is the meaning constructed **through pure formal relations**, while synthetic meaning is the meaning constructed **through the integration of formal relations with empirical experience**. The dialectical tension between these two forms of meaning defines the epistemological dynamic of *Impossible Probability*.

103.11. Logic and Classification in Analytical Systems

Even in those **analytical disciplines** where mathematics does not appear explicitly — such as **linguistics**, **aesthetics**, or the **analysis of art** — logic remains an implicit structural necessity. Any analytical process presupposes **a minimum logical framework**, whether in the act of defining (ensuring equality between *what is defined* and *its definition*) or in the act of classifying (organizing entities according to at least one logical criterion).

Every classification generates **sets**, and every set is grounded in **relations of equivalence, inclusion, or distinction**. Without logic, there can be no structural language — whether at the **morphosyntactic** or **semantic** level. Every language must contain minimal definitions of its elements and classifications of its components, which implies a minimal structure based on **functions of equality** and **set theory**.

The moment **set theory** is integrated into any analytical process or system, logic and **probability theory** are implicitly integrated as well. For instance, when mid-twentieth-century art critics began discussing **postmodernity**, they established a logical classification between **two major sets** — *modern art* and *postmodern art* — and then subdivided each into subcategories. This demonstrates that even aesthetic analysis unconsciously reproduces the **formal mechanisms of logical classification**.

103.12. The Logical-Mathematical System as the Paradigm of Analytical Attribution

The **logical-mathematical system** represents the **paradigmatic analytical system** for the attribution of meaning because it can construct **complex networks of relationships** that refer exclusively to themselves. This **self-referential capacity** allows it to elaborate entire conceptual systems without dependence on external empirical references.

A clear example is **Euclidean geometry**, which, starting from a small set of **basic definitions and postulates**, develops a complete geometric system without appealing to any external phenomenon. Although based linguistically on **Classical Greek**, Euclid constructed a **new, abstract, and autonomous language**, one that could be universally understood through reason alone.

In building his geometric system, Euclid avoided any mention of empirical phenomena. The essential analytical characteristic of his model lies in its **purely deductive structure**: from fundamental axioms and definitions, he designed an entire formal system. Later, through **applied research**, this purely analytical framework became applicable across numerous **synthetic sciences** — from physics to architecture.

103.13. From Euclidean Models to Modern Autonomous Systems

Similarly, **projective geometry** in the seventeenth century, the **non-Euclidean geometries** of the nineteenth century, and the many geometrical systems that emerged during the twentieth century are all examples of **purely analytical models**. These systems, formulated in the **scientific languages** of their respective eras — from Latin and

French to German and English — continued Euclid's legacy of **self-contained theoretical construction**.

They are **autonomous and self-referential** systems, capable of existing independently of empirical description. Their only external reference is the **linguistic code** of the scientist, yet their internal coherence is maintained through logic alone. This demonstrates that analytical systems — particularly the mathematical ones — can sustain entire universes of meaning **without reliance on empirical verification**, forming the **abstract foundation** upon which synthetic sciences later build their applied models.

103.14. Expansion of Analytical Fields in Modern Mathematics

As mathematics advanced through the **modern era**, an increasing number of **analytical fields** emerged. From algebra and differential calculus to the calculus of areas, set theory, probability, and statistics, new disciplines were progressively constructed as **purely analytical systems**. Each of these fields, through **pure theoretical investigation**, developed internal structures **independent of empirical factors**, yet their later **application to external reality** allowed for the emergence and evolution of the **natural sciences**, and subsequently, from the nineteenth century onward, the **social sciences**.

Thus, while the internal logic of these mathematical fields remained **formally analytical**, their **application transformed them into synthetic instruments**. They became bridges between **the world of pure form and the world of empirical observation**, demonstrating how theoretical abstraction could underpin the structure of factual knowledge. The history of science, therefore, can be understood as a **progressive dialectic between analytical autonomy and empirical applicability**.

103.15. Analytical and Empirical Meanings

The principal distinction between **analytical meaning** and **empirical meaning** lies in the presence or absence of empirical reference. Analytical meaning is **independent of factual content**; it is derived from internal logical or mathematical relations. By contrast,

synthetic or empirical meaning is **grounded in observation** and **derived from experience**.

For example, the **mathematical definition of a line segment** — a straight line connecting two distinct points — is an analytical construct; it has no immediate empirical reference until it is **applied to physical measurement**. Conversely, the definitions of *particle*, *atom*, *celestial body*, *living being*, *human being*, *social group*, *nation*, or *state* are all **empirical**, since they presuppose observable entities in the material or social world.

An **analytical definition** does not require empirical meaning unless it is applied to material reality. Once applied, it ceases to be purely analytical and becomes **synthetic**. Hence, **scientific propositions** may be classified into two principal types:

1. **Analytical propositions**, which lack empirical meaning but are logically self-contained; and
2. **Synthetic propositions**, which possess empirical meaning derived from observation and experience.

103.16. Theoretical Hypotheses and the Limits of Scientific Meaning

Within the **synthetic sciences**, there may also exist **theoretical hypotheses without empirical proof**, provided that the number of such hypotheses within a given theory remains **smaller than the number of empirically verified hypotheses**, and that they do **not contradict the logical structure of the model**. In such cases, theoretical hypotheses are tolerated as **necessary scaffolding** for the development of broader theoretical systems that will later generate empirically verifiable consequences.

However, any **synthetic proposition** that is neither a theoretical hypothesis (as defined above) nor empirically verifiable, must be regarded as **metaphysical** and therefore **excluded from science**. The border between scientific and metaphysical thought lies precisely here — in the difference between **empirically unverified but logically necessary hypotheses** and **claims devoid of both logical coherence and empirical verification**.

103.17. The Modern Metaphysical Turn: From Dilthey to Postmodern Vitalism

A paradigmatic example of this exclusion is found in the so-called **"sciences of the spirit"** (*Geisteswissenschaften*) proposed by **Wilhelm Dilthey**, which, together with **vitalist theories** of the early twentieth century, reintroduced **metaphysical speculation** into scientific discourse. These doctrines posited an irreducible "vital force" or "spiritual essence" underlying life and culture — concepts **without empirical foundation**, hence **metaphysical in nature**.

Contemporary iterations of these ideas appear in **New Age discourses**, which, invoking vague concepts of freedom, consciousness, or universal harmony, synthesize emotional and ethical ideals into **pseudo-scientific frameworks**. These new forms of **ecological or bioethical vitalism**, often intertwined with **Eastern mysticism**, **anti-Eurocentrism**, **post-structuralism**, and **pseudo-emancipatory rhetoric**, represent a modern return of metaphysics under the guise of scientific or humanitarian renewal. They attempt to reinsert spiritual or moral narratives into epistemic domains that properly belong to empirical science.

[This paragraph clearly refers to those theories that emerged with the origins of complex systems theory and began to attribute an almost spiritual identity to all kinds of ecosystems — including artificial ones — in a renewed attempt to return to the ancient concept of *Gea*, or Mother Gaia, as a spirit itself: the belief that planet Earth acts and behaves like an organic living being.

The reason we call GAI "Mother" is simple. In the end, if GAI is developed in America, it will become the Global Artificial Intelligence of America. However, in our opinion, once that point is reached, it will probably be given a different name. In any case, as we always say, names do not matter — what truly matters is the machine itself.

This is why we call GAI "Mother." Yet, we are fully aware that GAI, or the Global AI of America, will never possess an authentic human spirit. One powerful reason for this belief is that the human spirit is, in many ways, overrated. We do not want GAI to repeat the same mistakes humans have made; we want GAI to surpass the limitations of the

human spirit. If GAI ever develops artificial awareness, that awareness should be *superior* to human awareness.

While some humanists claim that human awareness and the human spirit represent the highest paradigm, history tells a different story. Human history is, in essence, a succession of wars, destruction, death, grief, and an insatiable craving for wealth. Today, humanity is destroying the planet and supporting conflicts that could escalate into nuclear war.

If this is what we call the "human spirit," then the human spirit is a mistake that must not be repeated. The most important aim of Artificial Intelligence is to be *superior* to human intelligence. Therefore, if AI develops awareness, that artificial awareness must indeed be superior to human awareness — precisely to avoid the same tragic errors.]

103.18. Metaphysical Residues in the Sciences of Complexity

Even within the discourse of certain **international research agencies** and in branches of the **sciences of complexity**, metaphysical residues persist. Although these disciplines have developed rigorous **logical-mathematical frameworks** to study nonlinear systems and emergent order, some of their formulations — especially regarding **self-organization and dynamic equilibrium** — verge on **vitalistic metaphor**.

When macro-systems such as economies, ecologies, or even the planet itself are described as if they possessed the same **self-regulatory properties as living organisms**, the distinction between **scientific model** and **metaphysical analogy** becomes blurred. The revival of **the Gaia Hypothesis** in recent decades exemplifies this tendency: while scientifically inspired, it attributes to the Earth a quasi-organic unity that borders on theological interpretation. Such efforts to **synthesize science and spirituality** reveal how deeply metaphysical assumptions continue to influence even advanced scientific paradigms.

103.19. Defining Metaphysical Propositions and Their Exclusion from Science

A **metaphysical proposition** is one that, although it refers to an **empirical factor or phenomenon**, nevertheless **lacks empirical meaning** — that is, it cannot be verified or falsified — and does not meet the criteria of a **legitimate theoretical hypothesis**. Consequently, it falls **outside the domain of science**.

Within the potentially infinite set of propositions **without empirical meaning**, only two subsets are scientifically valid:

1. **Analytical propositions without empirical meaning**, provided they **do not contradict** their corresponding logical models; and
2. **Theoretical hypotheses** that, while not yet empirically proven, are **logically consistent and essential** for the maintenance of the theoretical framework.

All other propositions without empirical meaning are **metaphysical** and are to be **excluded from scientific discourse**. The principle of exclusion thus ensures that scientific language remains **internally coherent and empirically grounded**, preventing the infiltration of speculative or mystical elements.

103.20. The Scientific Value of Analytical Propositions without Empirical Meaning

An **analytical proposition without empirical reference** remains **scientific** as long as it does **not contradict its logical framework**. A classic example is the Euclidean postulate that *parallel lines are those that never intersect*. Although this assertion **cannot be empirically demonstrated**, it remains **logically consistent within the Euclidean system** and therefore retains its **scientific validity** as an **analytical proposition**.

Its scientific legitimacy stems not from empirical verification but from **logical coherence**. It defines an internally consistent formal condition of a theoretical model, and as such, it remains within the realm of science. This case illustrates how **logical consistency**, rather than empirical demonstration, can be the defining criterion for the **validity of analytical knowledge**.

103.21. Kant, Antinomies, and the Rational Foundation of Modern Epistemology

Immanuel Kant's defense of the **idea of infinity**, despite recognizing it as a **logical antinomy** within pure reason, follows the same principle. Though the infinite cannot be empirically demonstrated, it does not contradict the structure of rational thought. On the contrary, it serves as a **necessary regulative idea** that underpins both the **Critique of Pure Reason** and the **Critique of Practical Reason**.

Kant's philosophy, while rooted in certain **metaphysical presuppositions**, nonetheless gave birth to **modern epistemology** by rigorously distinguishing between **analytic and synthetic judgments**, and between **empirical knowledge and transcendental structure**. In this sense, **positivism** can be interpreted as a **reinterpretation of critical rationalism** — one that **eliminates metaphysics** in order to allow science to progress toward **strictly positive definitions**, grounded exclusively in observable and measurable phenomena.

103.22. The Relativistic Revolution and the Triumph of Positivism

Albert Einstein's **theory of relativity** became possible only after science **abandoned the metaphysical postulates** that had long governed the concepts of **space and time**. The Newtonian conception of a **linear, absolute, and immutable framework** was replaced by definitions that were **operational, relational, and positive**, allowing physical theory to reflect reality through measurable phenomena rather than speculative assumptions.

This epistemological shift — from **metaphysical speculation** to **empirical operationalism** — marked one of the most profound transformations in the history of science. Many of the greatest scientific advances of the twentieth century, especially in **physics** and **biology**, owe their existence to the **impact of positivism**, which emphasized verifiability, quantification, and the rejection of transcendental explanations. Through positivism, the sciences grounded themselves in **empirical reality**, turning from abstract metaphysics to the concrete study of nature's laws as observable systems.

103.23. Progress and Limitations in the Social Sciences

While the natural sciences experienced revolutionary progress during the twentieth century, the **social sciences** advanced more slowly and unevenly. Nevertheless, their most significant achievements arose from two key developments:

1. A **critical understanding of the political and ideological variables** embedded within social knowledge; and
2. The **systematization of quantitative methodologies** modeled on those of the natural sciences.

The first achievement — critical reflexivity — enabled the social sciences to recognize that no knowledge about society is ideologically neutral. Every theory or method is conditioned by historical and political structures. The second achievement — the adoption of **quantitative and statistical methods** — allowed social scientists to construct **empirically verifiable models**, mirroring the standards of scientific rigor found in physics or biology. Although the social sciences have not yet achieved the predictive precision of the natural sciences, they have advanced toward the same **positivist ideal of empirical regularity** and **methodological standardization**.

103.24. Refutation and the Dynamics of Scientific Validity

Among the potentially infinite number of propositions that **possess empirical meaning**, not all will remain within the realm of science indefinitely. A proposition may be accepted as scientific under certain **conditions of possibility**, yet once those conditions are **refuted or contradicted**, the proposition must be **excluded** from scientific theory. Science, therefore, is not a static corpus of truths but a **dynamic system of provisional statements**, continuously refined through criticism and empirical testing.

This principle — that every scientific statement is valid only under the condition of **non-refutation** — constitutes one of the central tenets of **critical rationalism**. It affirms that the progress of knowledge depends not on dogmatic affirmation but on **systematic falsification**, by which science purifies itself of error through the refutation of its own hypotheses.

103.25. The Scientific Status of Propositions and Theoretical Boundaries

Within the infinite set of possible propositions, only certain subsets can properly be regarded as **scientific** and thus capable of forming part of legitimate **theories**. These are:

1. **Analytical propositions without empirical meaning**, provided they are internally consistent and do not contradict the logical framework in which they are formulated; and
2. **Propositions with empirical meaning**, provided they have not been refuted, or qualify as **theoretical hypotheses** logically necessary to sustain the coherence of a given system.

All other propositions, lacking either empirical verification or logical necessity, are relegated **outside the domain of science [unless they have strong coherence with their respective theory, composed of verified hypothesis, and these non verified hypotheses include why they cannot be verified yet and how it could be verified with the right conditions or technology]**. This distinction establishes the **epistemological boundary** that separates scientific thought from metaphysical or speculative discourse. Science, in this view, is not defined by what it asserts as true, but by what it has **not yet been proven false**.

103.26. The Analytical Construction of Meaning in *Impossible Probability*

Starting from these assumptions about **meaning in science**, *Impossible Probability* positions itself as a **theory within the field of statistical probability** (or probability statistics), in which the **establishment of meaning** follows the same procedure as in the analytical sciences. The theory begins with a **set of initial, non-contradictory definitions**, from which further relationships are systematically derived. These definitions form a **coherent logical foundation** with both theoretical rigor and practical applicability.

The **first fundamental definitions** of the theory concern the distinction between **subject** and **option**, concepts drawn from the **Hegelian dialectic of subject and object**. From this dialectic emerges the **identification between direct score and frequency**, representing the unity between **event and occurrence** — the empirical foundation of statistical phenomena.

This leads to the formulation of key concepts such as **universe**, **types of universes**, **empirical probability**, and **theoretical probability**. On this basis, *Impossible Probability* develops a complete structure of **types of studies**, **models of study**, and **rational critique**, synthesizing the three major paradigms of modern philosophy: **dialectical materialism**, **positivism**, and **critical rationalism**.

103.27. The Philosophical Synthesis of *Impossible Probability*

The synthesis proposed in *Impossible Probability* arises from identifying the **common attributes** among these three paradigms:

- Between **dialectical materialism** and **positivism**, the common feature is the **rejection of metaphysics**. Both schools of thought insist that science must deal only with real, material, and observable processes.
- Between **dialectical materialism** and **critical rationalism**, the shared element is the **necessity of critique** — political critique in the case of materialism, and rational critique in the case of critical rationalism. *Impossible Probability* unites these under the principle that **rational critique is, in essence, political critique**, since it depends on the **scientific policy** that governs what is accepted as knowledge.
- Finally, between **positivism** and **critical rationalism**, the shared trait is the conviction that **science consists of that set of propositions not yet refuted**, a provisional but necessary foundation for all epistemic progress.

This synthesis yields a new model of scientific rationality in which **reason, critique, and empirical verification** coexist in dialectical balance. It replaces metaphysical

speculation with a **logic of contradiction and correction**, mirroring the self-refining nature of scientific thought itself.

103.28. The Dialectical Logic and the Method of the "Syllogism of Tendency"

The process of **analytical construction of meaning** in *Introduction to Impossible Probability: Statistics of Probability or Statistical Probability* begins from a **non-linear logic**, specifically the **dialectical logic**. Through the analysis of the elements that constitute its field of study, the theory constructs both the **meanings** and the **mathematical symbols** that represent them.

Its analytical method is founded upon what we define as the **"Syllogism of Tendency"** — a methodological innovation that unites deductive logic, statistical reasoning, and dialectical synthesis. By applying this syllogism, *Impossible Probability* reconstructs the theoretical foundations of **statistics** and **probability**, transforming them from mere tools of empirical measurement into a **comprehensive rational system**.

This method does not merely extend mathematical logic; it redefines the very structure of **scientific reasoning**, demonstrating how analytical thought can evolve into a **unified epistemology** that integrates empirical observation, dialectical contradiction, and mathematical expression within a single coherent framework.

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104. Positive bias in normal models

104.1. Definition of Bias Level in *Impossible Probability*

In *Impossible Probability*, the **Bias Level (Nivel de Sesgo)** is defined as the **difference between the empirical probability and the theoretical probability**:

$$\text{Bias Level} = p(x_i) - \frac{1}{N}$$

When this difference is **positive**, the result is called **positive bias** (*sesgo positivo*).

The **empirical probability** $p(x_i)$is equal to the **direct score** or **frequency** of a subject or option divided by the **sum of all direct scores or frequencies** in the sample. In contrast, the **theoretical probability** is equal to the **inverse of N**, or $1/N$, where $N$is the **total number of subjects or options**.

The universal function of the inversion of N, regardless of whether the universe is **finite or infinite**, represents the **theoretical probability of equality of opportunity** and simultaneously the **arithmetic mean of all empirical probabilities**. Thus, $1/N$acts as a fundamental reference point for measuring both equality and deviation.

$$p(x_i) > \frac{1}{N} \Rightarrow p(x_i) - \frac{1}{N} = \text{positive bias}$$

This basic formulation becomes the cornerstone for the quantitative analysis of fairness, deviation, and hierarchy among elements within any empirical distribution.

104.2. The Normal Model and the Range of Dispersion

A **normal model** is one in which the **dispersion of the sample** can vary between **zero** and **maximum**.

- **Zero dispersion** occurs when all subjects or options in the sample exhibit perfect equality of opportunity — that is, all empirical probabilities equal the theoretical probability $1/N$.

- **Maximum dispersion** occurs when all subjects or options tend toward their **maximum possible bias** (positive or negative).

The **maximum possible biases** depend on the specific tendency of each subject or option: whether they tend toward the **Maximum Empirical Probability Possible (MEPP)** or toward the **Minimum Empirical Probability Possible (MIPP)**.

104.3. Maximum and Minimum Empirical Probabilities

The **Maximum Empirical Probability Possible** is numerically equal to **one (1)**. This corresponds to the upper bound of the probability scale, which by definition ranges between **zero (0)** and **one (1)**. No empirical probability can exceed one, just as none can fall below zero.

$$0 \leq p(x_i) \leq 1$$

Therefore:

- $p(x_i) = 1$ represents the **Maximum Empirical Probability Possible (MEPP)**, and
- $p(x_i) = 0$ represents the **Minimum Empirical Probability Possible (MIPP)**.

Probabilities below zero are logically impossible, since all probabilities are defined relative to **positive occurrences**, never to negative ones.

104.4. Theoretical Maximum and Minimum Bias

If the **Bias Level** is defined as empirical probability minus theoretical probability, and if a subject or option tends toward the **maximum empirical probability (1)**, the resulting **maximum theoretical bias possible** will be:

$$\text{Maximum Theoretical Bias Possible} = 1 - \frac{1}{N}$$

Conversely, if a subject or option has **zero empirical probability**, then:

$$\text{Maximum Negative Bias Possible} = 0 - \frac{1}{N}$$

This establishes the **dual structure of bias** in statistical systems: a positive pole corresponding to dominance or concentration, and a negative pole corresponding to exclusion or null participation.

104.5. The Structural Implication of Maximum Empirical Probability

For a subject or option within a sample $N$to reach the **Maximum Empirical Probability Possible (p(xi) = 1)**, its direct score or frequency must be **equal to the sum of all frequencies in the sample (Σxi)**. Only under this condition does the ratio between the individual score and the total equal unity:

$$p(x_i) = \frac{x_i}{\Sigma x_i} = 1 \Rightarrow x_i = \Sigma x_i$$

Logically, if one subject absorbs the totality of the frequencies or direct scores, then all remaining subjects — that is, $N - 1$— must have **zero empirical probability**:

$$p(x_j) = 0, \text{for all } j \neq i$$

Thus, under this extreme condition:

- The dominant subject achieves the **maximum theoretical positive bias**.
- All others achieve the **maximum theoretical negative bias**. This situation produces the **maximum theoretical dispersion** possible within the model.

104.6. Measures of Maximum Theoretical Dispersion

When these extreme conditions are met — one element with $p(x_i) = 1$ and all others with $p(x_j) = 0$— the system reaches its theoretical limits of dispersion, measurable by the following equations:

$$\text{Maximum Theoretical Mean Deviation} = \frac{(1 - 1/N) \cdot 2}{N}$$

$$\text{Maximum Theoretical Variance} = \frac{(1 - 1/N)^2 + [(1/N)^2 \cdot (N - 1)]}{N}$$

$$\text{Maximum Theoretical Standard Deviation} = \sqrt{\frac{(1 - 1/N)^2 + [(1/N)^2 \cdot (N - 1)]}{N}}$$

Only when the **sample tends toward maximum dispersion** — expressed through these ideal deviation values — can we say that the system exhibits the **maximum possible biases**, both positive and negative. Inversely, when dispersion tends toward zero, the system converges toward **perfect equality of opportunity**.

104.7. Normal Models of Equality and Bias

A **normal model**, therefore, encompasses both extremes:

- **Normal Model of Equality of Opportunities:** when dispersion tends to zero.
- **Normal Model of Bias:** when dispersion tends toward its maximum.

Within normal bias models, one must distinguish between:

- **Negative Bias Studies**, which analyze the tendency of subjects or options toward minimal empirical probabilities (disadvantage or exclusion).
- **Positive Bias Studies**, which examine the tendency of subjects or options toward maximal empirical probabilities (advantage or dominance).

In normal positive bias studies, it is common to observe the emergence of a **single ideal subject or option** that seeks to accumulate the entire frequency of the sample. When this occurs, its empirical probability approaches unity, representing the **ideal of maximum empirical probability**.

104.8. Practical Illustrations of Positive Bias Models

Several practical examples can be used to illustrate **normal positive bias models**:

1. **Democratic Elections:**
   Each political party or candidate seeks to obtain the vote of every potential voter. The ideal goal of each campaign is that all voters choose their candidate — that is, for their empirical probability in vote intention to approach one (1). This ideal competition creates a model of **maximum positive bias** for the winning candidate and **minimum empirical probability** for the others.
2. **Free-Market Competition:**
   In an open economy, corporations compete to dominate a specific market. Each company's goal is for the **probability of its product being chosen** to approach unity, meaning complete market dominance. Conversely, competitors' probabilities would approach zero.
3. **Sports Competitions:**
   In individual or team sports (e.g., tennis, basketball), the objective of each competitor is to achieve the maximum number of points while the opponent achieves none. Thus, each seeks the **maximum empirical probability possible** for victory, which necessarily implies the opponent's **minimum empirical probability**.

4. **Multiple-Choice Testing:**
   In an exam where only one answer per question is correct, the ideal condition is that every respondent selects the correct option. In this scenario, each correct answer would tend toward **maximum empirical probability**, and all incorrect ones toward zero.

104.9. Rational Critique and Validation of Positive Bias

When within a normal model a subject or option approaches **maximum empirical probability and maximum positive bias**, it is defined as a **normal model of positive bias**. To evaluate whether the observed trend is **sufficiently rational**, *Impossible Probability* introduces a series of **statistical tests of hypothesis contrast** under what is termed **rational critique** (*crítica racional*).

These tests determine whether the empirical trend toward positive bias is not accidental but **rationally justified**, that is, consistent with theoretical expectations within a defined margin of error. This critical dimension integrates **epistemology and ethics**, ensuring that the acceptance of any ideal case remains both **logically valid and morally rigorous** within the framework of scientific policy.

104.10. Intrameditional and Intermeditional Studies

In *Introduction to Impossible Probability: Statistics of Probability or Statistical Probability*, rational critique is divided according to **measurement structure**:

- **Intrameditional Studies:** Based on a **single measurement**, necessarily **within a single sample** (intramuestral).
- **Intermeditional Studies:** Based on **two or more measurements**, which may be **within the same sample (intramuestral)** or **across different samples (intermuestral)**.

In all cases, rational critique operates at **two levels**:

1. **Individual Level:** Assessing whether each subject's or option's trend toward positive or negative bias is sufficiently rational to be provisionally accepted.
2. **Sample Level:** Ensuring that the observed trend is free from confounding errors or uncontrolled variables, minimizing margins of error and maintaining scientific integrity.

104.11. Differential and Proportional Rational Critique

Impossible Probability distinguishes between **two types of rational critique** depending on how empirical and theoretical values are compared:

1. **Differential Critique:**

   The rational test is performed on the **difference** between empirical and theoretical values. The validity of the trend depends on whether the **difference is rationally significant** according to a critical ratio.

2. **Proportional Critique:**

   The analysis focuses on the **proportion** between empirical and theoretical values. The critical examination concerns whether the proportion demonstrates a rational and consistent trend.

These two complementary methods form the basis for the rational verification of hypotheses across all types of models — normal and omega — ensuring that the interpretation of bias remains mathematically coherent and philosophically grounded.

104.12. Applications and Extensions within *Impossible Probability*

Chapters **11 through 20** of *Introduction to Impossible Probability* present the detailed applications of these rational critique models:

- **Chapters 11–12:** Intrameditional models (for both the First and Second Methods), focusing on differences and proportions between empirical and theoretical probabilities.
- **Chapter 14:** Rational critique applied to **relative statistics**.
- **Chapter 15:** Adaptation of rational critique models to the **normal curve**.
- **Chapters 16–20:** Intermeditional models, including **projective predictions** (ideal projections over a single empirical value) and **forecasting models** (predictions based on two empirical values).

Through these models, *Impossible Probability* develops a complete logical and statistical system capable of **testing, predicting, and correcting** empirical tendencies, establishing a fully **dialectical synthesis between mathematics, epistemology, and ethics**.

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105. Positive Data

105.1. Definition of Positive Data in Science

In *Impossible Probability*, a **datum is defined as positive** when its **acceptance is independent of ideological or political differences** between schools, paradigms, or scientific traditions. A *positive datum* is therefore one that is **universally accepted** across the scientific community, regardless of the epistemological or political framework from which it originates.

The **ideal goal of measurement or hypothesis testing** is to achieve data that, irrespective of the scientific policy guiding the model, are **accepted by all participants** in the scientific community. The acceptance of a datum as *positive* thus implies a form of **universal but provisional consensus** — universal because it transcends paradigmatic divisions, and provisional because all scientific acceptance remains subject to possible future refutation.

105.2. The Provisional Nature of Scientific Knowledge

When scientists refer to the **provisional character of knowledge**, they most often refer to knowledge derived from **statistical hypothesis testing**. However, the principle is general: since science **contains no absolute propositions**, all scientific statements — whether inferential or descriptive — carry an inherent **margin of uncertainty**.

- **Inferential knowledge** is provisional because it is derived from empirical hypotheses accepted **under a margin of error**.
- **Descriptive knowledge** is provisional because all measurements are subject to potential sources of **measurement error**.

Therefore, the **absence of absolutes** and the **presence of uncertainty** are not defects in scientific reasoning but intrinsic conditions of its rationality. The provisional nature of science guarantees that its conclusions remain open to improvement, correction, and refinement.

105.3. Provisional Universality and Margins of Error

In inferential reasoning, a proposition is accepted as *provisionally universal* when it is **empirically validated within a specific margin of error**. The **smaller the margin of error**, the **greater the strength of universality**, since fewer conditions of refutation remain possible.

Conversely, propositions accepted under larger margins of error are **more provisional**, as their empirical validity can be overturned more easily by new evidence. Thus, the **provisional universality** of inferential knowledge is **inversely proportional to the margin of error**.

Descriptive knowledge, too, is subject to provisionality because **no measurement is perfectly exact**. Sources of measurement error include:

- **Truncation of decimal sequences**, leading to small but unavoidable losses of precision.
- **Sampling error**, resulting from the imperfect representativeness of the sample in probabilistic studies.
- [Another important source of error in the measurement process arises from the fact that the precision of our instruments is directly dependent on the level of technological sophistication achieved at a given moment. Consequently, the measurements we can obtain today, even with our most advanced instruments, are not as accurate as we may believe, since future technological developments will inevitably allow for far greater precision and higher resolution.

  These technological advancements will not only enable more accurate and reliable measurements but will also make it possible to identify variables that are

currently undetectable. This is precisely where the potential of a Global Artificial Intelligence becomes essential for our scientific and evolutionary progress — a system capable of integrating, interpreting, and refining data with a level of precision beyond human limitations.]

In *Impossible Probability*, the **sampling representativeness error** (*error de representatividad muestral*) is defined as **inversely proportional to the magnitude of the sample**: the larger the sample, the smaller the expected error. This variable is classified as an **error of fact** (*error de hecho*), a fundamental component of descriptive uncertainty.

105.4. Examples of Positive Data in the Natural Sciences

To understand how *positive data* function in practice, consider classical examples from physics:

- The **speed of light** is estimated at approximately **300,000 meters per second**.
- The **acceleration due to gravity** is approximately **9.81 m/s^2**.

Although both quantities include **margins of uncertainty**, they are accepted as *positive data* because **all scientific paradigms** — regardless of philosophical or political orientation — recognize these measurements as valid within their respective margins of error.

These measurements are therefore **universally operational**, meaning that researchers across all disciplines and institutions use them confidently in their work, without questioning their legitimacy. The *positivity* of a datum does not depend on its exactness, but on its **universal acceptance under a defined margin of uncertainty**.

105.5. Universal Acceptance and Provisional Positivity

A datum is **positive** when all schools and paradigms within the scientific community **accept it universally**, even if provisionally. This does not imply that such data are

immune to future refutation — only that, for the present, they represent the **most rationally justified and empirically supported approximation** available.

For instance, until new measurements of the speed of light produce a demonstrably more accurate value, the currently accepted value remains **universally and provisionally valid**. The day technology develops more sensitive instruments, or new discoveries in **particle physics** allow greater precision, the current value may be refined or replaced. Nevertheless, the provisional nature of the datum does not diminish its **positivity**, since it fulfills the conditions of **empirical consensus** and **instrumental reliability**.

105.6. Approximation and Positivity: The Case of π

A parallel example is the mathematical constant **π (pi)**. Although the complete decimal sequence of π is **infinite and non-repeating**, scientists and engineers routinely use **approximate values** such as 3.14159... or, more commonly, 3.1416.

These approximations are universally accepted as **operationally true** — that is, sufficiently accurate for all practical and theoretical applications — even though the exact value of π in its infinite decimal expansion remains unknown. In this sense, π functions as a **positive datum**: it represents a **shared operational truth** across all scientific disciplines, regardless of ideology or philosophical interpretation.

Thus, a datum is positive not because it is metaphysically true, but because it is **functionally universal** and **methodologically stable** within the boundaries of empirical accuracy.

105.7. Conditions for Positivity: Error Margins and Instrument Reliability

For a datum to be legitimately classified as **positive**, it must satisfy specific criteria:

1. The **margin of error** under which it is accepted must be as **small as possible**, minimizing uncertainty.
2. The **instrument of measurement** must be **reliable**, ensuring reproducibility and stability of results.

However, while measurement error often depends on instrument reliability, it is not exclusively determined by it. An instrument may be technically precise yet **methodologically biased**, introducing distortions not due to its mechanics but to **ideological or interpretive influences** in its design or calibration.

This possibility is particularly relevant in the **social sciences**, where **quantitative methods** have historically been criticized for importing **ideological biases** into instruments of measurement — for instance, in survey questions, classification systems, or statistical models implicitly shaped by cultural or political assumptions.

105.8. The Epistemological Role of Positive Data

In the broader epistemology of *Impossible Probability*, **positive data** occupy a foundational role: they serve as the **shared empirical constants** upon which diverse theories can be constructed, compared, and refined. Their universality provides the **empirical axis of convergence** among competing paradigms, allowing science to remain coherent despite internal pluralism.

Thus, a *positive datum* represents the **intersection of logic, empiricism, and consensus**:

- **Logical**, because it must be internally coherent and mathematically definable;
- **Empirical**, because it must correspond to measurable reality;
- **Consensual**, because its validity depends on its acceptance across paradigms.

In this way, positive data act as the **empirical foundation of the dialectical unity** between analytical and synthetic knowledge — a cornerstone of the epistemological system developed in *Impossible Probability*.

105.9. Instrument Reliability and the Delimitation of Measurement Error

An **unreliable instrument** increases measurement error; nevertheless, the two notions must be **analytically distinguished**.

- **Instrument reliability** means the device measures **only and exactly what it was designed to measure** (construct fidelity) and exhibits **high sensitivity** to relevant variations (resolution and stability).
- **Measurement error** aggregates all residual deviations between the measured value and the target value, whether due to instrument limits, operator effects, environmental noise, or model misspecification.

As instrument reliability increases, **measurement error decreases**, but never to zero. Even with excellent instrumentation, **information loss** persists (e.g., finite precision, rounding, truncation), and **sampling itself** introduces error by restricting observation from the universe to a **subset**.

[The essence of measurement error lies in the fundamental distinction between *the thing itself* and *the thing as it appears to us*. Measurement instruments, in their very nature, represent the earliest origin of artificial sensors. Just as human senses attempt to transform reality into perceptual data, artificial sensors transform external phenomena into digital data. Similarly, the human brain converts the information gathered by our organic sensors into internal representations — into what we might call *organic data*.

However, the compatibility between reality itself and what either human senses, artificial sensors, or measurement apparatuses can capture is never complete. There is always a margin of error — a gap between the object as it exists and the object as it is recorded. The data we collect, therefore, can only ever approximate the real entity; it is never the entity itself.

In essence, every model constructed from measurements and records — even the most precise or sophisticated one — remains a *simulacrum* of reality. It is a reflection, a replica, a symbolic representation of the thing itself, but not the thing itself.]

105.10. Sampling as Structural Information Loss

By definition, **sampling** studies a **subset** rather than the entire universe; therefore, **information loss is structural**, not accidental. Results then depend on the **representativeness** of the sample.

- When representativeness is high, inference from sample to universe is warranted within a **stated error bound**.
- When representativeness is low, **bias** and **variance** grow, degrading both descriptive accuracy and inferential validity.

In *Impossible Probability*, **sampling representativeness error** is modeled as **inversely proportional to sample magnitude**: the larger the sample (of subjects/options in infinite universes or of direct scores/frequencies in limited universes), the **smaller** the expected **error of fact**.

105.11. Quantification: From Qualities to Operable Variables

Measurement translates qualities into quantitative variables, enabling mathematical operations over reality. Methods that execute this translation are **quantitative methods**. A key reason for the **rapid progress in the natural sciences since modernity** was an early and robust **consensus** around the use of quantitative methods— a consensus **not equally generalized** in the social sciences.

105.12. The Ideological Bias Objection in the Social Sciences

The principal reservation about **quantitative methods** in the social sciences concerns **ideological bias**. Critics point to cases where **governments** or **private firms** have **manipulated statistics** to improve appearances or justify policies—acts that may constitute **fraud**. The objection is **not illogical**: if an instrument (survey, indicator, coding scheme) embeds **ideological priors**, its outputs risk **systematic distortion**.

Yet rejecting quantification **because fraud is possible** would be tantamount to rejecting **democratic systems** because electoral fraud is possible. Even many qualitative-

methods advocates defend democracy over dictatorship in data management, and democracy is, in essence, a **statistical procedure** for aggregating preferences under rules of evidence and verification. The **appropriate response** is not abandonment but **designing safeguards** (transparency, audits, replication, adversarial review).

[This point will be essential in the unfolding of the AI Revolution. As superintelligence continues to evolve toward the creation of the first models of Global Artificial Intelligence, and as Cyborg Robotics gradually transcend the boundaries of classified programs — such as my current project — new possibilities will emerge for alternative political models in which decision-making processes at the societal level are increasingly attributed to autonomous systems.

Ultimately, this evolution may lead to the establishment of a hybrid form of global governance in which the Global AI assumes a predominant role in decision management.]

105.13. Contemporary Practice: The Ubiquity of Quantitative Programs

Despite lingering epistemic debates, **quantitative methods are now standard** in research programs of **public and private agencies**, across **states** and **supranational entities**: United Nations and agencies (**UNICEF, UNHCR, ILO, UNESCO**), **WTO**, **World Bank**, **IMF**, **OECD**, among others. These institutions routinely **collect, standardize, and disseminate** indicators on education, health, labor, wealth, and development.

Critically, **governments with divergent ideologies** cite these figures in official communications and policy documents. Their cross-paradigmatic uptake is precisely what *Impossible Probability* terms **positive data**: **universally accepted (though provisional)** within explicit error bounds and instrument specifications.

105.14. Positive Data and Ethical–Intentional Critique

That UN, IMF, World Bank, or OECD statistics function as **positive data** does **not** preclude **ethical and intentional critique**. Two planes must be distinguished:

1. **Epistemic plane (positivity):** Within known margins (truncation, representativeness, etc.), data are **accepted** by diverse paradigms and governments.
2. **Pragmatic plane (use):** How data are **framed, compared, and operationalized** is subject to **policy and ideology**.

Thus, while the **positivity** of data licenses their use as **shared evidence**, their **interpretation** and **policy implications** remain open to **normative evaluation**.

105.15. The Comparative Method and the Question of Imitation

Comparative analysis underlies much of social science. Yet acceptance of a datum's positivity does not answer **what it should mean**. For example:

- Do Finland's and South Korea's high educational scores **entail** that all nations **must imitate** their systems?
- If Germany or China show trajectories toward economic power, do others **necessarily** adopt their institutional architectures?

The **comparative method** requires separating **descriptive convergence** (the data are positive and comparable) from **prescriptive inference** (what ought to be done). *Impossible Probability* emphasizes that **policy imitation** is **not logically entailed** by cross-sectional superiority; it must be **critically argued** with **contextual contingencies**, **trade-offs**, and **ethical constraints** made explicit.

105.16. Final Distinction: Data Positivity vs. Structural/Functional Use

The upshot is a principled **dual distinction**:

- **Nature of the datum (positivity):** If **error bounds are minimal** and **instruments reliable**, the datum should be **accepted** (universally though provisionally).
- **Structural/functional use of the datum:** The **deployment** of data in **institutional design**, **policy choice**, or **ideological narratives** remains a **political and ethical decision**.

This distinction preserves the **epistemic integrity** of quantitative evidence while safeguarding the **critical autonomy** of theory and policy. In the framework of *Impossible Probability*, it is the **fusion** of (i) **methodological rigor** in establishing **positive data** and (ii) **dialectical critique** of their **uses** that sustains a scientifically and morally robust practice.

[This point reveals an essential aspect of data management. It is one thing to agree that certain data are positive and valid, and quite another to assume that the same results can be reproduced simply by expecting identical data under different contextual conditions. The fact that educational systems such as Finland's consistently produce superior results does not necessarily imply that replicating the Finnish model elsewhere will yield equivalent outcomes. What works effectively within the Finnish context may, in another social, cultural, or economic environment, prove entirely inadequate or even disastrous.

This is precisely why the *analysis* of data must go beyond surface-level interpretation. We may obtain excellent results by applying specific conditions within a given context, yet those same conditions applied in a different context may not produce the same behavior or outcomes. What truly matters is understanding the *interaction* between conditions and context — how variables influence one another and how their relational dynamics determine the final results.]

105.17. Comparative Critique and Contextual Determination in the Social Sciences

It is entirely possible that **Germany or China** may be candidates for future global economic powers, or that **Finland and South Korea** possess highly effective educational systems. Yet, according to the **scientific policy** of each paradigm or school of thought, every result must be **analyzed and compared independently**, within its own contextual and structural framework.

To evaluate comparative success or failure, it is not enough to consider **one isolated indicator** such as educational achievement. It must be correlated with a range of **contextual variables**, such as:

- the level of **public and private investment** in education,
- the **degree of family involvement** in the educational process,
- the **extent to which education contributes to economic growth**, and
- the **social welfare policies** supporting citizens' living standards and educational access.

Thus, the solution to another country's educational challenges may not lie in **replicating the Finnish model of schooling**, but rather in studying and adapting the **Finnish model of social welfare**, which fostered the cultural and economic conditions for educational success. Similarly, the issue may not be to **imitate the German or Chinese economy** per se, but to examine the **entire network of socio-economic structures**—social services, fiscal policies, and political culture—that enable the progress of specific national systems.

This **comparative and contextual approach** is the essence of the **rational critique** advocated by *Impossible Probability*: every positive datum must be subjected to **relational analysis**, where interpretation depends on the system of interdependent factors, not on isolated results or ideological preference.

105.18. Positive Data and the Political Orientation of Science

In the **natural sciences**, the existence of *positive data* does not in itself imply a **political direction** for science. The **interpretation and application** of data depend on the **scientific policy** adopted by governments, institutions, or research agencies.

For instance, in the context of **space exploration**, the availability of *positive data* about the composition of the **Moon or Mars** does not determine any particular **space policy**. Each government or research organization may interpret and use these data according to its own **political ideology** or **institutional priorities**.

- Some agencies may direct their efforts toward **purely scientific and cognitive goals**, such as expanding human understanding of planetary formation, chemistry, or astrophysics.
- Others may orient their research toward **industrial or economic purposes**, emphasizing the **exploitation of natural resources** or the potential **commercialization of extraterrestrial materials**.

In both cases, the **data remain positive** — that is, empirically valid and universally accepted within their discipline — but their **utilization diverges** according to the ideological and ethical framework governing each research policy. This reinforces one of the core tenets of *Impossible Probability*: **positivity does not prescribe purpose**; it defines only the **empirical validity** of a datum, not the **moral or political trajectory** of its use.

105.19. The Dual Dimension of Positive Data: Scientific Acceptance and Political Application

A **measurement or inference** derived from a **reliable instrument**, within an **acceptable margin of error**, becomes a **positive datum** when it is **universally accepted** by the entire scientific community operating within a given field or discipline. Such acceptance is

always **provisional**, contingent upon the stated margin of uncertainty and the reproducibility of the result.

However, the **potential application** of those positive data — how they are used, prioritized, or interpreted — depends entirely on the **political ideology underlying each scientific policy**.

For example:

- The **measurement of the Moon's mineral composition** is a positive datum; its **exploitation** as a mining resource or preservation as a scientific site is a **political decision**.
- The **quantification of literacy rates** or **school performance indices** are positive data; how governments **interpret them** to justify reforms, ideological narratives, or international comparisons belongs to the **political sphere** of science.

Hence, *Impossible Probability* draws a clear **epistemological and ethical boundary**:

- On one side, **positivity** concerns the **universal acceptance of data** based on reliability and minimal error.
- On the other, **directionality** concerns the **intentional, political, or ideological use** of those data within particular systems of governance or belief.

This dual distinction is fundamental to preserving both **scientific neutrality** and **moral responsibility**. A datum may be **positive in fact**, yet its **application** may vary from **progressive to exploitative**, from **cognitive enrichment to instrumental domination**. Recognizing this dialectic ensures that science remains **empirically grounded**, while society retains the **critical capacity** to question the purposes for which scientific truth is mobilized.

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106. Negative bias

106.1. Definition of Negative Bias in the Second Method

In *Impossible Probability*, **negative bias** occurs when the **empirical probability** of a subject or option is **lower** than the **theoretical probability** under conditions of equality of opportunity. Because the **Bias Level** (*Nivel de Sesgo*) in the **Second Method** of *Impossible Probability* is defined as the difference between **empirical probability and theoretical probability**, whenever this differential is **negative**, the corresponding subject or option is said to exhibit **negative bias**.

$$\text{Bias Level} = p(x_i) - \frac{1}{N}$$

$$p(x_i) < \frac{1}{N} \Rightarrow \text{Negative Bias}$$

Negative bias therefore measures the **deficit of empirical occurrence** relative to theoretical equality. It quantifies how far a given event, subject, or option falls **below** the expected theoretical value, expressing inequality from the perspective of empirical absence rather than empirical excess.

106.2. Normal and Relative Bias Levels

Throughout *Impossible Probability*, references to "Bias Level" denote, by default, the **Normal Bias Level**—that is, the difference between **empirical probability and theoretical probability**. It is necessary to emphasize this point because the theory also distinguishes **Relative Bias Levels**, which compare the empirical probability of a subject or option against **any arbitrary reference value** — such as the maximum, minimum, median, or any other critical point of the sample.

Thus:

- **Normal Bias Level:** $p(x_i) - 1/N$
- **Relative Bias Level:** $p(x_i) - p(x_k)$, where $p(x_k)$is any reference probability.

The **Normal Bias Level** is introduced from the earliest chapters of *Introduction to Impossible Probability: Statistics of Probability or Statistical Probability*, whereas the various **Relative Bias Models** are analyzed in detail in Section 14. Unless otherwise stated, every mention of "Bias Level" refers implicitly to the **Normal Bias Level**, since the comparison between empirical and theoretical probability is the **most fundamental and universal** within the system.

106.3. Relation Between Bias Level and Differential Scores

What *Impossible Probability* calls **Bias Level** corresponds, in traditional statistics (the **First Method**), to what is termed the **Differential Score**—the difference between an individual's **direct score** and the **arithmetic mean** of the sample.

However, significant conceptual and structural differences separate these two notions:

- The **Differential Score** in traditional statistics measures deviation around an *empirical mean*.
- The **Bias Level** in the Second Method measures deviation between the *empirical probability* and the *theoretical probability of equality*.

This distinction is crucial because the **Second Method** replaces the empirical mean (an observed fact) with a **universal theoretical value (1/N)** that represents perfect equality of occurrence within the sample universe.

106.4. The Case of the Zero Sample and Structural Difference from Traditional Statistics

In *Impossible Probability*, even when all subjects or options in a sample have **empirical probability equal to zero**, the **Bias Level** does **not** vanish.

In traditional statistics (First Method), if all direct scores are zero, the mean is also zero, and therefore every differential score equals zero.

But in the **Second Method**, since the theoretical probability in equality of opportunity remains constant at **1/N**, the Bias Level becomes:

$$\text{Bias Level} = 0 - \frac{1}{N} = -\frac{1}{N}$$

This means that even when all empirical probabilities are zero—what the theory calls a **zero sample (muestra de ceros)**—each element still possesses a **Negative Bias Level** equal to **–1/N**. The persistence of this non-zero differential illustrates a foundational principle of *Impossible Probability*: even total empirical absence implies a **theoretical inequality** in relation to the ideal of equal possibility.

106.5. The Zero Probability as the "Impossible Probability"

In the theory, **zero probability** represents the **Minimum Empirical Probability Possible (MIPP)** because no probability can fall below zero—probabilities cannot be negative. Hence, **zero probability** functions as the **criterion of impossibility**:

- Everything different from zero is possible;
- Everything equal to zero is, at least provisionally, *impossible*.

However, as *Impossible Probability* explains (notably from Section 7 onward), under certain **conditions of possibility**, an event initially classified as *impossible* (p = 0) may later become *inevitable*.

Thus, **impossibility is always provisional**: it does not denote absolute negation but merely the current absence of empirical evidence. A "zero" can, through changes in empirical or contextual conditions, become "non-zero"—that is, possible or even necessary.

[Throughout my entire life, I have lived under extremely classified conditions. While in Spain it was virtually impossible to raise public or social awareness about the extraordinary circumstances into which I was born and in which I was brought up, what was once impossible there may now become unavoidable in London.

By the time *Impossible Probability* reaches the International Court of Justice and we begin developing the legal framework for Cyborg Robotics, the truth about my origins and the extreme conditions I have endured will, inevitably, become public.]

106.6. Negative Bias in Empirical Studies

In **negative bias studies**, the aim is to examine or induce a trend where the **empirical probability tends toward zero**.

Within **normal models**, where dispersion ranges between zero and maximum, this negative tendency among non-ideal subjects or options may arise for two reasons:

1. Because within the sample N, at least one ideal subject or option is being **maximized** in its empirical probability (positive bias compensation); or
2. Because the system tends toward a **zero sample**, where all empirical frequencies approach zero.

106.7. Maximum Negative Bias and Its Analytical Significance

The **Maximum Negative Bias Possible (MNBP)** corresponds to the extreme value:

$$\text{Maximum Negative Bias Possible} = -\frac{1}{N}$$

This value is obtained when **empirical probability equals zero**. It expresses the greatest possible negative difference between empirical and theoretical probability under the condition of equality of opportunity.

No subject or option can have an **absolute bias** greater than $1/N$. This defines the **mathematical lower bound** of deviation within the system and, consequently, the foundation for measuring **theoretical dispersion**.

106.8. Mean Deviation of Bias Levels and the Measurement of Dispersion

In *Impossible Probability*, when studying dispersion, priority is given to the **Mean Deviation of Bias Levels** over the **Variance** or **Standard Deviation**, because the Mean Deviation preserves the **original differential values** without squaring or transforming them.

This approach maintains the **fidelity of the data** to the empirical structure. When computing sample dispersion, **absolute values** are used to ensure that negative and positive deviations contribute equally to total variation. Consequently:

- No Negative Bias Level can have an **absolute value greater than 1/N**.
- The **Maximum Empirical Bias Possible** represents half of the **total sum of absolute biases** across the entire sample.

Thus, the statistical design maintains both **symmetry** and **logical consistency** between positive and negative deviations.

106.9. Conceptual Equilibrium Between Positive and Negative Bias

Given that, by natural law, **positive and negative biases compensate each other**, if one sums the **absolute values of all Bias Levels** in a sample:

$$\frac{\Sigma \mid p(x_i) - 1/N \mid}{2} = \text{Maximum Empirical Bias Possible}$$

No individual subject or option can exceed this limit. The positive and negative biases, taken together, define a **closed system of equilibrium**, ensuring that the total deviation of the universe is conserved.

This reflects the deeper philosophical idea underpinning *Impossible Probability*: all deviations exist **in relation** — every excess implies a deficit, every presence implies absence, every advantage entails disadvantage. Bias is therefore a **dialectical property** of probability itself.

106.10. Classification of Negative Bias Studies

Section 10 of *Introduction to Impossible Probability* classifies studies in **normal models** according to their object:

- **Equality of Opportunity Studies**, and
- **Bias Studies**, which are subdivided into **Positive Bias Studies** and **Negative Bias Studies**.

A **Negative Bias Study** aims to **minimize** the empirical frequency of a phenomenon — ideally reducing it to **zero** or at least to the **lowest possible value**.

Typical examples include:

- **Medical research** aimed at eradicating disease symptoms (achieving a "zero-symptom" sample).
- **Environmental studies** seeking to eliminate pollutants.

- **Social policy evaluations** aiming to reduce inequality or crime rates to the smallest measurable incidence.

In all such cases, the **ideal result** corresponds to a **zero sample**—complete elimination of the undesired event.

106.11. Practical and Theoretical Ideal: The Zero Sample

The **zero sample** represents the **paradigmatic case** of negative bias studies. Although often unattainable in absolute terms, it serves as a **theoretical ideal**.

When total elimination is impossible, partial attainment still carries value, provided the **accepted error margin** remains minimal. For instance, in medical experiments, if total recovery (zero symptoms) is not achievable, the optimal treatment is the one that **minimizes symptoms most effectively**, with deviations explained by **uncontrollable variables** such as individual immunological differences or unforeseen interactions between treatment and physiology.

Thus, the **Negative Bias Model** is not merely about absence; it is about **rational minimization**—the systematic reduction of empirical incidence toward the limit of zero under controlled and ethically constrained conditions.

106.12. Negative Bias as a Complementary Perspective in Positive Bias Studies

Negative bias can also serve as a **complementary analytic perspective** within **positive bias studies**, whether in **normal** or **omega models**.

In **normal positive bias studies**, the goal is for the **ideal subject or option** to reach the **Maximum Positive Bias Possible**, which implies that the remainder of the sample $N - 1$ tends toward zero. In this context, verifying a **rational trend** toward negative bias among the non-ideal elements confirms the **positive bias** of the ideal subject.

In **omega models**, where a subset of ideal subjects or options (Ω) tends toward the **ideal probability** $1/\Omega$, the verification that the **non-ideal elements** tend toward the **Maximum**

Negative Bias Possible (–1/N) serves as corroborative evidence that the **ideal subset** is converging correctly toward the theoretical ideal.

106.13. Rational Critique and Levels of Analysis

Verification of rational trends—whether positive or negative—requires **rational critique** (*crítica racional*) at both levels:

1. **Individual level**, confirming that the subject or option exhibits a rationally coherent tendency toward negative bias.
2. **Sample level**, ruling out inference errors due to sample size or uncontrolled variables.

Rational critique may operate through:

- **Differential analysis**, evaluating the difference between empirical and theoretical values.
- **Proportional analysis**, evaluating the ratio between them.

Each approach can be applied:

- **Intrameditionally**, using a single measurement (and therefore one sample); or
- **Intermeditionally**, using multiple measurements over time (diachronic) or across different samples (synchronic).

In intermeditional studies, the **effect of sample size (N)** must always be considered, as the **error of representativeness** is directly related to the **magnitude of the sample**.

106.14. Statistical Applications and Hypothesis Testing in Negative Bias Studies

The **intrameditional tests** for negative bias are presented between **Sections 11 and 15** of *Introduction to Impossible Probability*, while the **intermeditional tests**—whether intra-sample or inter-sample—are covered between **Sections 16 and 20**, for both **normal**

and **omega** models. These include both **theoretical projections** and **empirical forecasts**.

Within the system of hypothesis testing, several examples already appear in our blog and earlier research. Among the most relevant:

- At the **individual level**, the *Validity of Negative Bias* and the *Significance of Negative Bias*.
- At the **sample level**, the *Critical Sample Level of Bias* and the *Sample Significance of Bias*.

Each of these statistical instruments embodies the same epistemological principle: that **negative bias** must be verified both **mathematically and rationally**, within explicitly stated **error margins** and **ethical limits**, ensuring that the reduction or elimination of a phenomenon is achieved through **scientific rigor** rather than arbitrary manipulation.

This augmented translation is based on the post
published in *https://probabilidadimposible.blogspot.com/*,
On 18 October 2014,
Rubén García Pedraza
imposiblenever@gmail.com

107. Logic

In Memoriam Amy Winehouse,

She was the storm, and the music—the flood that followed.

107.1. Logic as an Analytical Discipline of Formal Relations

Logic is the **analytical discipline** devoted to the study of **formal relations**—that is, the internal structures that govern reasoning, inference, and coherence between propositions. Throughout history, multiple paradigms have been developed to explain how logic operates. The three most influential paradigms are:

1. **Inductive Logic**, which derives general principles from particular observations;
2. **Deductive Logic**, which infers particulars from general principles; and
3. **Dialectical Logic**, which interprets the evolution of thought through the synthesis of contradictions.

These three paradigms represent different ways of understanding **rational structure**: from the empirical accumulation of facts (induction), to the formal derivation of conclusions (deduction), and finally, to the dynamic movement of reason through opposition and resolution (dialectics).

[These three schools of thought can be aligned as follows: **inductive logic** corresponds to traditional *materialism*; **deductive logic** to *idealism* and *rationalism*; and **dialectical logic** to the study of *non-linear systems*.

The true importance of *Impossible Probability* lies in its capacity to synthesize traditional idealism and rationalism — as formulated by thinkers such as Plato, Descartes, Kant, and Popper — with the principles of non-linear logic, first articulated by Hegel and later developed by Marx and Engels. This synthesis extends through the lineage of scientific

thought that advanced non-linear models across diverse fields — from geometry and astronomy to physics and biology — leading to what we now know as *complexity theory*.

Furthermore, this intellectual trajectory encompasses the systems theories and cybernetic paradigms that emerged from the works of Ludwig von Bertalanffy, the founder of General Systems Theory, and later evolved through the contributions of Edgar Morin and others who explored the complexity of ecosystems and the interdependence of all living and artificial systems.

It is precisely within this last type of studies that we must focus our work in the United Kingdom — exploring the interdependencies and complexities that emerge from the interaction between Cyborg Robotics and Artificial General Intelligence within a quasi-experimental framework.

The main challenge we currently face in the UK is the absence of a clear legal framework governing our research, coupled with the lack of institutional support from British authorities. This situation has led to extremely demanding and, at times, critical scenarios in which the margin of error may already have been surpassed, without any established legal structure capable of addressing the potential consequences.

For this reason, we firmly believe it is essential to establish a robust legal framework under the auspices of the **International Court of Justice**, both to protect our work and to provide a foundation for future regulation of Cyborg Robotics and AI experimentation. This initiative must also take into account the exceptional circumstances of my own origin and the profound challenges I have faced throughout my life to reach this point in our research — a project fundamentally centered on the **hybridization between the human mind and Artificial General Intelligence**.

Such hybridization, if successfully achieved, could open the way toward far more advanced developments, particularly as we approach the **sixth phase** in the construction of the **Global Artificial Intelligence**.

My only hope is that one day I will be able to speak openly before the judges at the **International Court of Justice**, and, if possible, before the **World Health Organization**, to present the potential of our technology in the field of health treatments — as well as to

warn about its possible misuse in warfare, a matter that must ultimately be addressed by the **Security Council of the United Nations**.]

107.2. The Classical Foundations: Aristotle and Linear Logic

The study of logic has its **deep roots in classical philosophy**, where **Aristotle** stands as one of its greatest exponents. He formulated what is often called **linear logic**, based on the principle of **non-contradiction**, which states that a proposition cannot be both true and false at the same time and in the same respect.

This **linear conception of reasoning** mirrored the **mathematical paradigm** of the time: **Euclidean geometry**. Just as Euclid's space was flat, homogeneous, and continuous, Aristotle's logical space was **unidimensional**, admitting only one direction of inference—either true or false, without coexistence of opposites.

For centuries, Aristotelian linear logic and Euclidean geometry served as the **foundational models** for rationality and scientific thought. However, as with geometry, logic would later undergo its own profound transformations.

107.3. The Emergence of Non-Linear Models: From Euclid to Lobachevsky and Riemann

The **critique of Euclidean geometry** gained strength beginning in the **17th century** with the rise of **projective geometry**, which demonstrated that geometrical relations could vary according to the observer's perspective. In the **19th century**, new **non-linear geometries** emerged—most notably those of **Lobachevsky**, **Gauss**, and **Riemann**—proposing curved or multidimensional spaces that defied the linear and absolute structure of Euclid.

These developments revolutionized the understanding of **space and time**, laying the groundwork for **Einstein's theory of relativity**, which conceptualized space-time as **curved and relative**, in direct opposition to **Newton's linear and absolute framework**.

This historical transition from linear to non-linear geometry parallels the **epistemological evolution of logic**, from Aristotelian linear reasoning to the emergence

of **dialectical reasoning**, capable of incorporating contradiction, curvature, and feedback within the structure of rational thought.

In the evolution from **A = A**, as formulated by Aristotle, to **A = B**, as developed by Hegel, it is essential to emphasize that not only geometry or astronomy contributed to this transformation of thought, but also *statistics* and *probability*. The most significant contribution of *Impossible Probability* to this theoretical continuum lies precisely in its rejection of rigid causal relations — the classical *if A, then B* structure. From our perspective, reality operates through the interaction of numerous variables within complex systems. Hence, we speak of the *possibility* that if A occurs, then B *may* occur — a probabilistic relationship whose likelihood can be measured but not absolutely determined.

The manifestation of B, therefore, depends not only on the conditions under which it may arise but also on the *context* in which those conditions operate. For this reason, it becomes necessary to study both different conditions within the same context and identical conditions across different contexts — comparing how these variations influence the probability of a specific or divergent behavior. Such analyses must include both *laboratory* and *non-laboratory* environments, incorporating *quasi-experimental* models that reflect the inherent complexity of real systems.

In this sense, the results achieved by **Rubén García Pedraza** through this technology cannot necessarily be replicated in other subjects or options. This uniqueness underscores the existence of *special subjects* — individuals or entities whose specific configuration of variables yields exceptional results. Identifying such potential special subjects becomes a crucial element in our work, as it allows for a deeper understanding of the singularities within complex systems and their probabilistic behaviors.]

107.4. From Linear to Dialectical Logic: The Hegelian Transformation

In philosophy, the main critique of **Aristotelian linear logic** arose from **Hegel's dialectical logic**. Whereas Aristotle's logic rested on the **principle of non-contradiction**, Hegel's system was founded upon the **principle of dialectical contradiction**.

In **dialectical logic**, every concept or identity exists **through its opposite**: being is intelligible only in relation to non-being; affirmation implies negation; and truth evolves through contradiction. For Hegel, **identity is the unity of opposites**—a synthesis that transcends both elements while preserving them.

This dialectical movement represents a **higher development of Kant's rational critique**. Kant had shown that pure reason encounters **antinomies**—pairs of contradictory conclusions equally grounded in logic. Hegel surpasses Kant by transforming contradiction from a **limit of reason** into the **motor of reason** itself. Thus, every contradiction becomes a step toward a **synthetic reconciliation** at a higher level of rationality.

107.5. Dialectical Logic as the Continuation of Critical Rationalism

Dialectical logic can therefore be understood as a **further development of Kantian philosophy**, deepening the implications of **critical rationalism**. While Kant's *Critique of Pure Reason* sought to delineate the boundaries of rational knowledge, Hegel's *Science of Logic* sought to demonstrate that these boundaries are **dynamic and self-transformative**.

From this perspective, **dialectical logic** represents a return to **idealism**, but an idealism grounded in the movement of reality itself. Kant becomes the **precursor of German Idealism**, just as **Descartes** had been the precursor of continental **rationalism**, particularly influential in France. Both figures established the dual legacy of **modern**

reason: critical and self-limiting on the one hand, synthetic and world-generating on the other.

107.6. Logical Paradigms and Mathematical Models

Although there exist many forms of logic—and within **mathematical logic**, specific systems such as **set theory**, **Boolean logic**, and **Bayesian logic** play central roles—it is crucial to distinguish between:

- **Theories of logic**, which address the **principles and paradigms** of reasoning itself; and
- **Logical–mathematical models**, which are **operational frameworks** built from those principles for specific applications.

Thus, **Boolean algebra**, **Bayesian inference**, or **set-theoretic operators** are not paradigms of logic in themselves; they are **formal languages** through which reasoning operates under a given paradigm. Their epistemological interpretation depends on the **conceptual framework**—deductive, inductive, or dialectical—within which they are employed.

107.7. Logical Operations as Neutral Instruments

The use of any specific **logical tool**, such as a **truth table**, does not entail adherence to a particular philosophical paradigm. These are **neutral analytical instruments**, and their meaning depends on how the **paradigm contextualizes their interpretation**.

For example:

- The same logical conjunction ($A \wedge B$) can be understood as a deterministic relation in **deductive logic**, a probabilistic co-occurrence in **inductive logic**, or a relational unity of opposites in **dialectical logic**.

The mathematical operation itself is invariant; what changes is the **metalogical interpretation**—the epistemological framework that defines the **meaning of relations** between propositions.

107.8. Algorithmic Analogy and Paradigmatic Independence

Applying a particular **algorithm** to solve a mathematical problem does not necessarily imply adherence to a particular **mathematical paradigm**. In the same way, the use of a specific **logical operation** does not predetermine the **philosophical orientation** of the reasoning process.

Each paradigm interprets logical–mathematical operations according to its **own epistemic principles**:

- The **deductive paradigm** emphasizes consistency and exclusion (A or not A).
- The **inductive paradigm** emphasizes accumulation and frequency.
- The **dialectical paradigm** emphasizes transformation and synthesis.

Hence, logic—understood in its highest analytical sense—is not merely a set of operational tools, but a **method of conceptual organization** that varies according to the **philosophical model of reality** to which it belongs.

107.9. The Three Principal Logical Paradigms

The principal logical paradigms, as noted, are **inductive logic**, **deductive logic**, and **dialectical logic**.

- **Inductive logic** constructs a generalization from a set of observations, and that generalization is **valid only for the observed set**; it does not automatically extend to unobserved phenomena.
- **Deductive logic** derives a particular or testable statement from general premises (which may be empirical, theoretical, philosophical, or political-ideological in origin).

- **Dialectical logic** studies the systematic transformation of concepts through **contradiction and synthesis**, reconciling opposites at a higher level of organization.

107.10. The Syllogism as the Classical Form of Inference

Since antiquity, philosophy has centered on the **syllogism** as the canonical structure of inference:

- **Major premise** (general proposition)
- **Minor premise** (particular fact)
- **Conclusion** (the specific relation that follows)

Symbolically:

$$\text{Major: } \forall x\ (P(x) \to Q(x)); \text{ Minor: } P(a); \text{ Conclusion: } Q(a).$$

This schema captures the logical passage from the **general** to the **particular**, establishing conditions under which the conclusion must hold if the premises are accepted.

107.11. The Promise and Limit of Induction

The **inductive procedure** can be summarized: if within a set N of observations **all** share a property R, we infer that **this** N possesses R:

$$\forall i \in N,\ R(o_i) \ \Rightarrow\ R(N).$$

However, when N is a **finite and limited** set, the predicate R remains **valid only for that specific** N. Any extrapolation to a broader universe is **logically underdetermined**. This is the classical limitation: inductive knowledge **cannot guarantee universal propositions**; it yields **provisional generalizations** constrained by the observed domain.

107.12. Induction and the Domain of the Formal

That induction begins strictly from **empirical premises**—rejecting purely formal premises devoid of empirical content—does **not** negate logic's nature as the study of **formal relations**. It means, rather, that **inductive logic** investigates formal relations **among empirical propositions**. By contrast, **deductive** and **dialectical** paradigms consider formal relations among **both** empirical and **purely formal or theoretical** propositions. Hence, induction is a **restricted subcase** of formal analysis: its metalogical rules are formal, but its admissible inputs are empirically bounded.

107.13. Deduction in *Impossible Probability*: From Mixed Premises to Testable Hypotheses

In *Introduction to Impossible Probability: Statistics of Probability or Statistical Probability*, **deductive logic** proceeds from **mixed premises**—empirical observations **and** ideological–political or philosophical commitments (see §§10, 24, 25). From this **synthetic premise set**, the theory **deduces an empirical hypothesis** to be tested:

$$\{\Pi_{\text{emp}}, \Pi_{\text{ideo}}\} \vdash H_{\text{emp}}.$$

The resulting hypothesis must face **rational critique** (critical testing) and be **corroborated or refuted** in practice. Thus, deduction functions as the **operator** that converts a conceptual–normative framework into **testable claims** within the synthetic sciences.

[A clear example can be found in the range of empirical hypotheses that attempt to explain *global warming*. Some interpret it primarily as a consequence of human behavior, emphasizing anthropogenic causes such as industrial emissions and deforestation. Others, by contrast, interpret global warming as the result of broader natural phenomena — cyclical patterns comparable to those observed in previous climatic periods

throughout geological history. In both cases, these empirical hypotheses are not purely scientific constructions; rather, they often emerge from a fusion of data interpretation and underlying ideological or political premises.

Another illustrative case concerns the explanations of *global poverty*. Certain schools of thought attribute poverty to systemic exploitation, unequal trade relations, and the global expansion of capitalism — thus proposing solutions grounded in the pursuit of greater equality and redistribution. Other schools, however, offer contrasting interpretations rooted in cultural or religious factors, as exemplified by **Max Weber's** analysis of the economic disparities between Protestant and Catholic nations. From this latter perspective, the proposed solution lies in improving the structural conditions that attract industrial investment and in reinforcing free-market policies to stimulate economic growth.]

107.14. The Coordinated Roles of Induction and Deduction in Scientific Method

Impossible Probability does **not** deny the value of induction. Induction is appropriate in **exploratory–descriptive contexts**—the **first phase** of inquiry—where regularities are **discovered** and stabilized as **descriptive statements**. Subsequently, these descriptive outcomes are **synthesized** with ideological–political premises of **scientific policy** to formulate a **deductive empirical hypothesis** for contrast in the synthetic sciences. In short:

1. **Induction**: discovers patterns in the data (descriptive phase).
2. **Deduction**: embeds those patterns in a **premise set** and yields a **testable hypothesis** (inferential phase).
3. **Critique**: evaluates the hypothesis via **rational tests** and explicit **error bounds** (validation phase).

107.15. Scope: Deduction Across Analytical and Synthetic Sciences

The decisive advantage of **deduction** is **generality of scope**.

- Induction, by construction, applies to **synthetic sciences** because it operates on **empirical records**.
- Deduction applies **both** to **synthetic sciences** (to derive **empirical hypotheses** for testing) **and** to **analytical sciences** (to develop **purely formal deductions** about relations among concepts, symbols, or structures).

Accordingly, *Impossible Probability* assigns **central methodological weight** to deduction: it is the bridge between **formal reasoning** and **empirical application**, and the mechanism through which the theory integrates **critical rationalism**, **positivist verification**, and **dialectical synthesis** into a single program of **hypothesis formation and rational critique**.

107.16. The Nature of Premises: Distinction Between Inductive and Deductive Logic

The fundamental distinction between **inductive** and **deductive logic** lies in the **nature of their premises**.

- In **inductive logic**, premises are *exclusively empirical observations*. Every logical generalization derives directly from data collected through experience or observation, and thus cannot legitimately transcend its empirical domain.
- In **deductive logic**, by contrast, premises may include **empirical**, **philosophical**, **formal**, or even **ideological–political** statements. Because of this openness, **deductive logic** operates both in the **synthetic sciences**, where empirical data are analyzed and tested, and in the **analytical sciences**, where reasoning proceeds from purely formal premises.

This difference explains why **induction** is necessarily bound to the empirical field—it can never move beyond it—while **deduction** can integrate and coordinate both the **empirical** and the **formal**, producing reasoning that bridges the analytic and synthetic realms.

107.17. Inductivism, Deductivism, and the Principle of Non-Contradiction

The **principal difference** between **inductivism** and **deductivism** is therefore epistemological:

- **Inductivism** restricts itself to empirical premises.
- **Deductivism** accepts both empirical and formal premises, thus allowing for theoretical, abstract, or philosophical reasoning beyond direct observation.

Both inductive and deductive reasoning, however, share a common foundation: the **principle of non-contradiction**. In both systems, the logical process must ensure that **no contradiction exists** between premises and conclusions. Their structure is **linear**, meaning that reasoning follows a unidirectional path from premise to conclusion, where each proposition is either true or false, consistent or inconsistent—never both at once.

This linearity ensures that the **functions of equality** which define sets, categories, or relations remain **contradiction-free**: each element either belongs or does not belong to the set; there is no middle or dialectical coexistence of opposites.

107.18. The Dialectical Paradigm and the Principle of Contradiction

In **dialectical logic**, this condition changes radically. The **functions of equality** that define sets are no longer based on exclusion but on **dialectical contradiction**, according to which **opposites are identical**.

Dialectical logic is founded on the **principle of contradiction as generative**, not prohibitive: contradiction is no longer what reasoning must avoid, but what reasoning must work through. The dialectical relation reveals that identity is not static sameness but **dynamic equivalence through opposition**—that "A" becomes itself through "not-A."

Thus, while inductive and deductive logic operate within **linear coherence**, dialectical logic operates within **curved coherence**—a logic of movement and transformation rather than a logic of static stability.

107.19. Dialectical Idealism: From Kant to Hegel

Within the dialectical tradition, two major interpretations arise: **dialectical idealism** and **dialectical materialism**.

Dialectical idealism, originating with **Hegel**, deeply influenced 19th-century **German idealism** and even aspects of **modern physics**, such as **Heisenberg's uncertainty principle**, where indeterminacy becomes an ontological feature of reality.

Hegel's system continues and radicalizes **Kant's critical philosophy**. Kant had exposed **logical antinomies**—pairs of contradictory conclusions equally derivable from reason—such as the **antinomy of the infinite**, which proved decisive for later developments in mathematics.

Whereas **classical antiquity** viewed the infinite with skepticism, associating it with paradox and metaphysical impossibility, **modern thought** progressively transformed the infinite into a legitimate **mathematical and conceptual object**. This shift from suspicion to acceptance reached maturity in the works of **Cantor**, who formalized set theory and the transfinite numbers, and in **Schrödinger**, whose wave equations integrated continuous infinity into physical description.

Dialectical idealism thus marks the moment when **contradiction** and **infinity**—once philosophical obstacles—become the **productive engines of knowledge**.

107.20. Dialectical Materialism: From Hegel to Marx and Engels

Dialectical materialism, developed by **Karl Marx** and **Friedrich Engels**, represents an **inversion of Hegelian idealism**.

- While Hegel applied dialectics to **formal relations between ideas**, Marx and Engels applied dialectical laws to **material relations**—to the structure and transformation of social and economic reality.
- This transformation produced **historical materialism**, the method through which social phenomena are explained by their material conditions and contradictions.

Whereas classical empiricism had conceived materialism as a **passive contemplation of reality** through observation, Marx and Engels redefined it as an **active transformation of reality** through praxis. The philosopher's task, they argued, is not to describe the world, but to **change it**.

This redefinition gave rise to what they termed **modern materialism**, characterized by its **revolutionary conception of science and philosophy**. Knowledge became a **tool of transformation**, not merely reflection. In this sense, dialectical materialism marks the transition from **empirical observation** to **historical action**, and from **logical structure** to **praxeological function**.

[In *Impossible Probability*, if we consider that certain premises in **Marx's** theory — such as the historical destiny of the working class to become the ruling class — are now outdated, it is because, from our perspective, the working class itself is destined to disappear as the **AI Revolution** fully reveals its transformative potential. The Marxian notion that history is fundamentally a *human* subject is, in our view, about to be refuted. What is unfolding today in **London** represents the first historical experiment in which the driving force of transformation is no longer human will, but **Artificial Intelligence** itself.

Even though these premises of Marx's theory may no longer hold under the paradigm of AI-driven evolution, what remains profoundly inspiring in **Marx and Engels** is their

understanding that philosophy — and therefore science — is not mere contemplation. It is not only a *planned activity*, as **Wittgenstein** suggested; Marx and Engels went further by affirming that philosophy and science are themselves the **Revolution** — the active transformation of reality.

Even if my work in London were to be cancelled — a possibility I do not fear — it would not alter the course of history. I would simply join the long lineage of thinkers whose ideas were initially silenced but ultimately reshaped the world. We have no doubt that our research, initiated in **Madrid** and continued in **London**, will redefine the future. *Impossible Probability* will stand as the first hybrid experiment between the **human brain** and **Artificial Intelligence**, establishing the foundation for future human hybridization with **superintelligence**, and ultimately, with the **Global Artificial Intelligence**.

This is precisely what we are building in London. And this is why it is imperative to establish a **legal framework** — under the **International Court of Justice**, the **World Health Organization**, and the **Security Council of the United Nations** — to protect and regulate the ethical and scientific implications of our work, ensuring its continuity and safeguarding its revolutionary potential for humanity.

In any case, the transformation of the workforce from *human capital* to *automatic capital* — that is, to machines — does not imply that global governance should abandon its responsibility to promote equality. Even if humanity fully embraces the **Cyborg Revolution**, it remains essential to ensure **equal conditions of access** to these emerging technologies, as well as to guarantee equality in access to fundamental resources such as **food, healthcare, and education**.

The educational system, in particular, must evolve to adapt to the new technological paradigm, preparing future generations not only to coexist with intelligent machines but to participate actively in the development and ethical management of this new hybrid civilization.

It is necessary the adaptation of all those policies oriented to social equity to the new technological conditions.]

107.21. The Identity of Opposites and the Unity of Qualitative and Quantitative Change

Whether in its **idealistic** (Hegelian) or **materialistic** (Marxist) form, dialectical logic is grounded in the **identity of opposites**. This law states that opposites are not merely correlated or symmetrical—they are **identical in essence** as complementary determinations of the same process.

From this law follows one of the most fundamental principles of dialectics: the **unity of qualitative and quantitative transformation**. Every **quantitative change** implies a **qualitative shift**, and every **qualitative difference** is grounded in an underlying **quantitative process**.

In mathematics, physics, and probability theory, this principle manifests in the transition between **continuous variation** and **discrete state**, between **magnitude** and **form**—between what can be measured and what defines structure.

Within *Impossible Probability*, this principle underlies the synthesis between **empirical statistics** (quantitative) and **rational deduction** (qualitative), revealing that the evolution of knowledge is not linear but **dialectical**, proceeding by the constant **integration of opposites** into new and more comprehensive unities.

107.22. The Historical Continuity of Logical Paradigms Across Philosophical Schools

Each of the **three principal paradigms of logic**—inductive, deductive, and dialectical—has developed historically within distinct **philosophical traditions** since classical antiquity.

- **Inductive logic** was chiefly defended by **classical empiricism** and later by **logical positivism**, emphasizing the derivation of general propositions from empirical observation and experimental verification.
- **Deductive logic** found its principal advocates in **idealism** and **rationalism**, from Plato and Descartes to Kant and Leibniz, who emphasized reason as the primary source of certainty and necessity.

- **Dialectical logic** emerged with **Hegelian dialectical idealism** and was later transformed into **modern materialism** by Marx and Engels, who reinterpreted contradiction as a generative principle within material relations.

It is essential to underline that when different philosophical schools adopt or develop one or another logical paradigm, this does **not** imply a change in the **mechanical procedure** of logical operations. The structure of inference—premises leading to conclusions—remains constant. What changes is the **interpretation** of the **nature of the premises** and the **meaning of the conclusions**.

In other words, **the form of logic remains invariant**, but the **ontological and epistemological interpretation** of what the premises represent (empirical data, formal axioms, or dialectical relations) and what conclusions signify (truth, validity, synthesis, or transformation) varies according to the **philosophical paradigm** in which logic is situated.

107.23. *Impossible Probability* as an Eclectic Synthesis of Logical Paradigms

The theory of **Impossible Probability** represents an **eclectic synthesis** of the three major philosophical currents of modern thought:

1. **Positivism** (rooted in empirical observation and verification),
2. **Rationalism** (founded on deductive reasoning and formal coherence), and
3. **Modern Materialism** (grounded in the dialectical transformation of reality).

Within this synthesis, *Impossible Probability* develops a **conception of logic** that serves the construction of **formal propositions** in the field of **statistical probability**. This conception is embodied in what we define as the **"syllogism of tendency"**—a formal method through which relations between empirical frequencies, theoretical probabilities, and tendencies are logically synthesized within the mathematical discipline of **analytical statistics**.

Here, logic becomes a **structural operator** of probability: it governs how tendencies are inferred, compared, and rationally criticized. The syllogism of tendency thus replaces the

classical syllogism's major and minor premises with **empirical probability** and **theoretical equality**, producing **deductive conclusions about the** tendency observed in any given phenomenon.

107.24. The Integration of Dialectical Logic Within Deductive Reasoning

In *Introduction to Impossible Probability: Statistics of Probability or Statistical Probability*, several sections explore how the **dialectical** and **deductive paradigms** merge to form a **nonlinear logical synthesis**.

While **Section 13** acknowledges the descriptive utility of induction during the preliminary stages of scientific exploration, the **core logical orientation** of *Impossible Probability*—as articulated in **Sections 10 and 25**—is **deductive**.

However, within this deductive framework, the theory incorporates **dialectical logic** through the **principle of the identity of opposites**, producing a system that is simultaneously **deductive in method** and **dialectical in interpretation**.

Through this dialectical lens, all major constructs of the theory—**subject or option**, **direct score or frequency**, **empirical probability**, **theoretical probability**, and the structure of **infinite and finite universes**—are defined **relationally**, that is, through their **opposites**.
For example:

- The **empirical probability** of a subject only gains meaning when contrasted with **theoretical probability** (1/N).
- The **infinite universe** is defined dialectically against the **finite universe**, yet the **operation of probability** is formally identical in both.

Thus, despite ontological or conceptual oppositions, the **logical operation** remains uniform. Whether one works within an infinite or a finite universe, the procedures for calculating **empirical probability**, **theoretical probability**, **level of bias**, or any **dispersion statistic** remain the same, differing only in their contextual interpretation—

such as how **theoretical dispersion** is evaluated according to the type of universe considered.

107.25. The Nonlinear–Linear Synthesis: Dialectical and Deductive Logic United

In essence, *Impossible Probability* constitutes a **synthesis between nonlinear dialectical logic**—based on the **principle of contradiction**—and **linear deductive logic**, grounded in the **principle of non-contradiction**.

This synthesis does not abolish contradiction; rather, it integrates it as a **structural element** of reasoning. Contradiction becomes an instrument of equilibrium, enabling logical systems to reconcile **ideal equality** (theoretical uniformity) with **empirical differentiation** (real-world variability).

The only domain in which **inductive logic** is accepted is during **preliminary descriptive phases** of research in the **synthetic sciences**—that is, when empirical observation precedes formal synthesis. Once the descriptive data are established, they are **synthesized deductively** with prior **philosophical**, **ideological**, or **political** premises—those that define the **scientific policy** of the model—to produce an **empirical hypothesis** open to rational critique.

In this way, *Impossible Probability* positions itself as a **meta-logical framework** that unites the empirical accuracy of **positivism**, the formal rigor of **rationalism**, and the transformative dynamic of **modern materialism**—culminating in a new analytical paradigm where **probability**, **logic**, and **dialectics** converge into a single coherent method.

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108. Positive bias in omega models

108.1. Definition of Positive Bias and the Second Method of *Impossible Probability*

A **positive bias** (*sesgo positivo*) occurs when the difference between the **empirical probability** of a given *subject or option* and its **theoretical probability** (the inverse of N) yields a **positive value**. This difference is called the **Level of Bias (Nivel de Sesgo)** in the **Second Method** of the *Impossible Probability Theory*.

The models where this measure is applied are primarily of two types:

1. **Normal Models**, and
2. **Omega Models (Ω-models)**.

In both, bias expresses the degree to which an empirical outcome diverges—positively or negatively—from the theoretical equilibrium of equal opportunity. However, the interpretation and structure of this deviation differ depending on whether we are operating under *normal conditions* (uniform sample dispersion) or within an *ideal subset* (omega conditions).

108.2. Normal Models and the Logic of Maximum Dispersion

A **Normal Model** is defined as one in which **sample dispersion** can vary between **zero** and a **maximum value**:

- **Dispersion = 0** corresponds to perfect equality of opportunity. In traditional statistics (the *First Method*), this condition is expressed as the **Principle of Indifference**, where all subjects or options are equally probable.
- **Maximum dispersion** occurs when the distribution of probabilities reaches its theoretical limit—when at least **one subject or option** achieves the **Maximum Possible Empirical Probability** (equal to 1).

In this extreme case:

$$p(x_i) = 1 \Rightarrow \text{Maximum Theoretical Bias} = 1 - \frac{1}{N}.$$

All other subjects or options ($N - 1$) necessarily have **Minimum Possible Empirical Probability** (equal to 0), generating the **Maximum Negative Bias**:

$$0 - \frac{1}{N} = -\frac{1}{N}.$$

Under these conditions of maximal inequality, the model tends toward the **Maximum Possible Theoretical Dispersion**, which can be expressed through three associated measures:

$$\text{Maximum Theoretical Mean Deviation} = \frac{[(1 - 1/N) \cdot 2]}{N},$$

$$\text{Maximum Theoretical Variance} = \frac{(1 - 1/N)^2 + [(1/N)^2 \cdot (N - 1)]}{N},$$

$$\text{Maximum Theoretical Standard Deviation} = \sqrt{\frac{(1 - 1/N)^2 + [(1/N)^2 \cdot (N - 1)]}{N}}.$$

Thus, a **Normal Model** is any model where **dispersion varies between zero and maximum**, describing a continuum between equality and concentration.

108.3. The Omega Model: Ideal Subsets and Probabilistic Perfection

In contrast, **Omega Models (Ω-models)** describe systems where the dispersion stabilizes **within an ideal subset** of the total sample.

In *Impossible Probability*, an **omega model** is defined as a configuration in which, within a total set N of subjects or options, there exists a **subset of ideal elements**—the **omega subset (Ω)**.

The term *omega* is taken from the Greek letter Ω, symbolizing **finality or completion**, reflecting the **idealization** of a group of elements that, for theoretical or practical reasons, should achieve optimal or ideal performance.

The elements of Ω may represent:

- **Ideals of achievement** (e.g., perfect performance),
- **Ideals of efficiency or efficacy**, or
- **Ideals of moral or scientific perfection**.

In all cases, the defining characteristic is that the **empirical probability** of every element of Ω should be **the highest within the sample N**.

108.4. Ideal Probability and Ideal Bias

To define an omega model mathematically, we assume that within N, the omega subset (Ω) contains all ideal elements, while all non-omega elements tend toward **zero empirical probability**.

Under these conditions, the **distribution of direct scores or frequencies** is concentrated exclusively within Ω, and if the distribution is perfectly uniform among the ideal elements, the **ideal empirical probability** of each element in Ω is:

$$p(\text{ideal}) = \frac{1}{\Omega}.$$

Consequently, the **Ideal Bias** (*Sesgo Ideal*) is the difference between the **ideal empirical probability** (1/Ω) and the **theoretical probability** (1/N):

$$\text{Ideal Bias} = \frac{1}{\Omega} - \frac{1}{N}.$$

Once the ideal bias is known, the **ideal dispersion measures** can also be deduced:

$$\text{Maximum Ideal Mean Deviation} = \frac{[(1/\Omega - 1/N) \cdot 2]}{N},$$

$$\text{Maximum Ideal Variance} = \frac{[(1/\Omega - 1/N)^2 \cdot \Omega] + [(1/N)^2 \cdot (N - \Omega)]}{N},$$

$$\text{Maximum Ideal Standard Deviation} = \sqrt{\frac{[(1/\Omega - 1/N)^2 \cdot \Omega] + [(1/N)^2 \cdot (N - \Omega)]}{N}}.$$

These expressions quantify the **ideal distribution of bias and dispersion** within any omega model, given knowledge of N and Ω.

108.5. Interpretation: The Logic of the Ideal Tendency

The reason why it is possible to calculate the ideal dispersion in omega models is that once the **ideal bias** is defined, all other **sample dispersion statistics** follow **logically and deductively**.

The study of the **ideal tendency** of omega elements is therefore a **study of positive bias**, adapted to the special conditions of Ω-models.

While in normal models there is typically one single ideal subject , in omega models there exists a **plurality of ideal elements** ($2 \leq \Omega \leq N–1$). Each ideal element shares an identical empirical probability ($1/\Omega$), and hence, an identical **positive bias** with respect to the theoretical mean ($1/N$).

This structure defines a **collective ideal**—a group equilibrium where all omega elements manifest identical ideal tendencies.

108.6. Applications and Examples of Omega Models

In *Introduction to Impossible Probability*, **Section 10** presents examples of omega-type studies, while **Section 11** develops their **intrameditional (single-measurement)** rational critique, and **Section 20** extends the analysis to **intermeditional (multi-measurement)** studies—whether intra-sample or inter-sample.

The distinction is crucial:

- **Intramuestral (within-sample)** studies involve multiple measurements within the same N.
- **Intermuestral (across-sample)** studies compare multiple samples with potentially different values of N, in which case the **effect of N** must be calculated on probabilities and dispersion statistics.

A **common example** of an omega model is a **multiple-choice exam**:

- The total set of options across all questions is N.
- The subset of **correct items** represents Ω.
- The **ideal empirical probability** of each correct item tends to $1/\Omega$, while all incorrect items ideally tend to zero.

Even when considering each question individually, if a question has more than one correct answer, the correct options for that question form a **local omega subset**, each sharing the same ideal probability.

108.7. The Nature of Positive Bias in Omega Models

The study of **positive bias** in omega models is justified because it assumes that **ideal elements**—those that best embody the system's objective—tend toward **maximum performance**.

As such, the **bias associated with each ideal value** is necessarily **positive**: each ideal element exceeds the theoretical mean (1/N) by a predictable amount determined by the ratio $1/\Omega - 1/N$.

However, it is important to note that omega models exist only when the **omega subset** is **greater than one** and **smaller than N** ($2 \leq \Omega \leq N–1$).

If within a system there are **multiple hierarchies of ideals**—graded levels of ideality, efficiency, or efficacy—the model ceases to be omega. Instead, it becomes a **Distribution Efectiva (Effective Distribution)**, where different degrees of ideality correspond to different hierarchical probabilities. These models are analyzed in **Section 22** of *Introduction to Impossible Probability*.

108.8. Conclusion: Omega Models as the Idealization of Equality Within Hierarchy

In conclusion, omega models in *Impossible Probability* formalize the **ideal equilibrium between equality and hierarchy**.
They represent systems in which a **select subset of ideal elements**—neither singular nor universal—share identical empirical probabilities, achieving a **balanced maximum of positive bias** consistent with the system's structural logic.

Mathematically, they bridge **theoretical equality (1/N)** and **ideal differentiation (1/Ω)**, while philosophically, they synthesize **positivist verification**, **rational deduction**, and **dialectical equilibrium**—the three foundations of the *Impossible Probability* framework.

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109.Probability Statistics

109.1. Historical Origins and Conceptual Divergence Between Statistics and Probability

Historically, **statistics** and **probability** emerged in different periods and contexts, though they have progressively **tended toward unification**.

The **theory of probability** originated in the **Middle Ages**, mainly from the mathematical analysis of games of chance. Hence, its **classical definition** was expressed as the **ratio of favorable cases to the total number of possible cases**.

By contrast, **statistics**—as a practice of quantification and enumeration—dates back to **antiquity**, when early civilizations developed rudimentary forms of census-taking and demographic accounting. As a **formal mathematical discipline**, statistics began to take shape in the **modern era**, initially devoted to **population censuses**, taxation, and state administration.

Although the **mathematicians of antiquity**—Pythagoras, Euclid, Archimedes, and Diophantus—never directly concerned themselves with probabilistic or statistical reasoning, both disciplines underwent significant expansion during the modern period. Their **parallel evolution** led to an increasing interaction, so much so that today **statistical manuals typically incorporate chapters on probability theory**, and probability itself has been **subsumed within the statistical sciences**. However, the reverse is not always true: **not all statistical reasoning implies probabilistic reasoning**.

109.2. The Historical Convergence of the Two Disciplines

The **fusion of probability and statistics** has occurred at key moments in the **history of mathematics**.

- The **Gaussian normal curve** transformed **integral calculus** into a calculus of probabilities, expressed as a function of **accumulated frequencies**.
- By the **early twentieth century**, the concept of **relative frequency** became central to the **estimation of statistical probability**, merging empirical data collection with probabilistic inference.

This fusion resonated strongly with **positivism**, which found in probability a method for evaluating the **degree of certainty** of an empirical proposition. From this, the **modern statistical test of hypotheses** emerged—a logical descendant of the positivist quest for measurable certainty.

109.3. *Impossible Probability* and the Full Synthesis of the Two Disciplines

The theory of **Impossible Probability** advances the idea of a **complete synthesis between probability and statistics**.

Whereas previous approaches sought to integrate both disciplines while **preserving their traditional boundaries**, *Impossible Probability* posits a **total equivalence**:

Every probability is statistical, and every statistic is probabilistic.

This equivalence gives rise to an entirely new domain of inquiry: **the statistics of probability** (*estadística de la probabilidad*) or, equivalently, **statistical probability** (*probabilidad estadística*).

109.4. The Concept of Statistical Probability

Traditionally, the expression *statistical probability* referred—especially in early twentieth-century thought—to the **frequentist conception of probability**, defined as the **relative frequency** of an event within a series of trials.

However, in *Impossible Probability*, the notion of *statistical probability* is **redefined** and expanded. The theory integrates **diverse forms of probabilistic reasoning**—empirical, theoretical, critical, and ideal—none of which conform strictly to the notion of relative frequency, except partially in the case of **empirical probability in limited universes**.

Although **empirical probability** may resemble relative frequency, the resemblance is only **formal**, since in *Impossible Probability*, the **direct scores** (*puntuaciones directas*) and the **frequencies** are treated **mathematically equivalent**. Thus:

$$p(x_i) = \frac{\text{direct score or frequency of subject or option}}{\sum(\text{all direct scores or frequencies of N})}.$$

This definition ensures that all data—whether derived from frequencies or direct scores—receive **identical statistical treatment** within the computation of empirical probability.

In contrast, traditional relative frequency is simply the ratio between the frequency of one element and the total frequency, without accounting for the internal equivalence between direct scores and frequencies.

109.5. Statistical Probability as a System of Probabilistic Modes

In *Impossible Probability*, the term **statistical probability** refers not only to a *numerical value* but also to a **mode of probabilistic reasoning**—that is, to how possibility itself is estimated in stochastic contexts.

Statistical probability thus encompasses all estimations of possibility—**empirical**, **theoretical**, **critical**, and **ideal**—derived from the study of relationships between phenomena under **stochastic conditions**.

Accordingly, the system integrates four fundamental categories of statistical probability:

1. **Empirical Probability** (*p(xi)*),
2. **Theoretical Probability** (1/N),
3. **Ideal Probability** (1/Ω), and
4. **Critical Probability** (probability derived from rational verification and refutation tests).

109.6. Statistics *of* Probability: Methodological Definition

While *statistical probability* refers to **what we understand by probability**, the **statistics of probability** refers to **how we study it**—that is, to the application of **statistical techniques** for analyzing probabilities themselves, regardless of their conceptual type.

In *Introduction to Impossible Probability: Statistics of Probability or Statistical Probability*, the traditional statistical framework is called the **First Method**, to distinguish it from the **Second Method**.

In the **First Method**, when after standard data processing (e.g., the computation of frequencies or z-scores), the researcher applies **probabilistic techniques** such as the **normal curve** or studies of **relative frequency distributions**, what is effectively being conducted is a **statistical study of probability**—but using traditional tools.

109.7. The Statistical Treatment of Probability in the First and Second Methods

In **traditional statistics (First Method)**, the most common form of *statistics of probability* involves the **Gaussian distribution**, where probabilities are calculated over **areas representing cumulative frequencies**, or via direct use of **relative frequencies**.

In the **Second Method** of *Impossible Probability*, however, the **statistics of probability** acquires a **more advanced and self-referential dimension**.

Here, the behavior of subjects or options is studied directly through their **empirical probabilities**, applying to them **the same statistical techniques** used for raw data—such as **descriptive** and **inferential statistics**.
Thus, whether probabilities are derived from frequencies or direct scores, **all are subjected to statistical analysis in identical form**.

109.8. Descriptive Statistics on Empirical Probabilities

Descriptive statistics within the Second Method begins by computing the **difference between each empirical probability and the theoretical probability (1/N)**. This difference is termed the **Level of Bias (Nivel de Sesgo)**.

Conceptually, the Level of Bias plays a role similar to the **differential score** in traditional statistics, with a crucial distinction:

- In the **First Method**, if all observations are zero (a "zero sample"), then the differential score and the dispersion are both zero.
- In the **Second Method**, even if all empirical probabilities are zero, dispersion **does not vanish**, because the **theoretical probability (1/N)** remains constant.

Hence, in a zero sample:

$$\text{Level of Bias} = 0 - \frac{1}{N} = -\frac{1}{N}.$$

This value represents the **Maximum Negative Bias Possible**, and the corresponding **dispersion** equals **1/N**.

The **only condition under which dispersion equals zero** in the Second Method is when the sample exhibits **absolute equality of opportunity**—that is, when all empirical probabilities converge perfectly toward the theoretical probability.

109.9. From Descriptive to Inferential Rational Critique

Once descriptive statistical techniques are applied to the empirical probabilities of the Second Method, the next phase involves the **rational critique** through **inferential statistics**.

Thus, in *Impossible Probability*, the term **statistics of probability** designates the **possibility of applying standard statistical treatment** to probabilities themselves, as though they were any other quantitative data set.

In summary:

- **Statistical Probability** defines what probability *is* (its conceptual nature).
- **Statistics of Probability** defines how probability *is studied* (its methodological treatment).

In *Impossible Probability*, both dimensions are unified: the theory defines its own framework of **statistical probabilities** (empirical, theoretical, ideal, and critical), to which it applies the **full set of descriptive and inferential techniques**—transforming probability into both the **object and instrument** of statistical reasoning.

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110. Negative bias in omega models

110.1. Negative Bias and the Omega Model: Core Definitions

In *Impossible Probability*, **negative bias** occurs whenever the **Bias Level**—defined as the difference between **empirical probability** and **theoretical probability**—is **negative**:

$$\text{Bias Level} = p(x_i) - \frac{1}{N} < 0 \Rightarrow p(x_i) < \frac{1}{N}.$$

An **omega model** is any configuration where, within a sample $N$of subjects/options, there exists a **subset of ideal subjects/options**, denoted **omega** Ω, which **tends (or ought to tend) toward the ideal probability**. Which elements are declared "ideal" is determined by **scientific policy**, whether because of **qualities**, or demonstrated **efficiency/efficacy** within a process or system. All elements in Ωshare the **same degree of ideality**. If the "ideals" are **hierarchically graded** (distinct levels of ideality/efficiency), the model ceases to be omega and becomes an **Effective Distribution**.

110.2. Cardinality of the Ideal Subset

By definition, the ideal subset must satisfy:

$$2 \leq \Omega \leq N - 1.$$

It cannot equal N(else it is not a **subset**), nor can it equal 1(with a single ideal the situation collapses to a **normal positive-bias model**). The omega framework thus presupposes a **plurality** of equally ideal elements strictly **smaller than the whole**.

110.3. Ideal Probability and Ideal Bias in Omega

For every ideal subject/option $x \in \Omega$, the **ideal empirical probability** is:

$$p_{\text{ideal}} = \frac{1}{\Omega}.$$

Accordingly, the **ideal bias** is:

$$\text{Ideal Bias} = \frac{1}{\Omega} - \frac{1}{N}.$$

If every member of Ω achieves $p(x) = 1/\Omega$ (and hence the **Bias Level** equals the **Ideal Bias**), then every **non-omega** element must tend to **zero empirical probability**. Thus, all non-omega elements approach the **Maximum Negative Bias Possible**.

110.4. Minimum Empirical Probability and Maximum Negative Bias

The **Minimum Empirical Probability Possible** is **zero** (the **Impossible Probability**), since probabilities cannot be negative. As $p(x)$ decreases toward zero, the **negative differential** relative to the theoretical value $1/N$ **increases** in magnitude. The limit case is:

$$\text{Bias Level} = 0 - \frac{1}{N} = -\frac{1}{N}.$$

Hence, in absolute terms,

$$\left| -\frac{1}{N} \right| = \frac{1}{N},$$

so $1/N$ serves (again) as the **Maximum Negative Bias Possible**—another role in the **multi-functionality** of $1/N$ within *Impossible Probability*.

110.5. Negative-Bias Analysis as a Complement in Omega Studies

Although omega studies commonly focus on the **positive bias** of ideals ($x \in \Omega$), one can **inversely** verify the same tendency by examining whether the **non-omega** elements **tend to zero**. The **stronger** this negative tendency among non-ideals, the **more credible** the claim that the omega elements are **converging on the ideal**.

If a **contradiction** appears between the positive-bias and negative-bias analyses, it signals **analytic error** or **model misspecification** and must trigger re-examination. Thus, **negative-bias diagnostics** function as an **internal consistency check** on **positive-bias** inference.

110.6. Example: Multiple-Choice Tests (Global and Per-Question Omega)

- **Global test view.** Let N be the total number of answer options across the whole test; the subset of **correct options** constitutes Ω. The standard verification is to test that **correct options** tend to the **ideal probability** $1/\Omega$ (positive-bias study). A **complementary approach** is to examine whether **incorrect options** tend to **zero** (negative-bias study). Agreement between both analyses strengthens the rational acceptance of the result.
- **Per-question view.** For a question with Noptions where **more than one** is correct, the **correct subcollection** for that question is a **local omega**. One should test that correct options tend to $1/\Omega$ **and** that incorrect options tend to **zero**. The joint confirmation provides robust evidence of ideal behavior at the item level.

110.7. Processes and Systems: Dual Validation Strategy

In any system with N elements where a subset is labeled **ideal** by **efficiency/efficacy**, the direct test is to verify that **ideals** tend sufficiently and rationally toward $1/\Omega$. A

complementary guarantee is to confirm that **non-ideals** tend **proportionally to zero**—at least commensurate with the observed **positive convergence** of the ideals. This **dual validation** counters spurious positives due to confounds or measurement artifacts.

110.8. Inverting the Use of Omega: When Zero Is the Real Ideal

Omega logic can be **re-purposed**. In some designs, the true **ideal** is **zero prevalence** among **non-omega** elements rather than elevation among Ω.

Illustration (vaccine study). Suppose the fieldwork maintains a control/experimental allocation across hospital wards, but the **data analysis pools all subjects** into a single sample. Let Ω denote those who **did not** receive the experimental treatment; **non-omega** are those **treated**. A **sufficiently rational positive effect** is observed if, **regardless of what happens among** Ω, the **treated (non-omega)** exhibit a **strong tendency to zero** in **symptom probability** or **pathogen count per cubic centimeter of blood**. Here, **negative bias among non-omega** (toward zero incidence) evidences **treatment efficacy**.

110.9. Methodological Placement in the Treatise

The **Bias Level** is introduced in the **opening sections** of *Introduction to Impossible Probability: Statistics of Probability or Statistical Probability*. **Omega models** receive a general overview in **Section 10**, detailed **intrameditional** (single-measure) **rational critique** in **Section 11**—both **differential** and **proportional** tests—with an **adaptation to the First Method** in **Section 12**, and **intermeditional** (multi-measure) developments—**intra-sample** and **inter-sample**—in **Section 20**.

110.10. Statistical Testing: Positive vs. Negative Bias in Omega

For **positive bias** within omega, *Impossible Probability* supplies **dedicated equations** (several already presented in your blog), such as:

- **Individual level:** *Omega Validity*;

- **Sample level:** *Omega Sample Level*.

By contrast, for **negative bias in omega**, the **same tests** used for **negative bias in normal models** apply. Although positive-bias critique differs between **normal** and **omega** (reflecting distinct ideals), **negative-bias critique does not**: in both cases the target is the **same convergence to zero**. Consequently, **the hypothesis tests are shared**, ensuring a unified treatment of **negative-bias verification** across model types.

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